



Protocol Converter Model A/S-4



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INSTRUCCIONES DE SEGURIDAD (Normas Oficiales Mexicanas Electrical Safety Statement)

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
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11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
 - A: El cable de poder o el contacto ha sido dañado; u
 - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
 - C: El aparato ha sido expuesto a la lluvia; o
 - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
 - E: El aparato ha sido tirado o su cubierta ha sido dañada.

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1. General Information

THE A/S-4 is an SNA protocol converter. It is capable of a wide variety of conversions and adaptation tasks. Listed below are just a few of the tasks the A/S-4 was designed to perform:

- Bit-oriented protocol, SDLC
- Byte-oriented protocol, ASCII
- Serial Data Transfer and Conversion
- Screen Emulation of various CRTs
- Storage of prompting commands
- Protocol conversions
- Character conversions
- Communication conversions

The A/S-4 is also designed to be easily installed and operated. The A/S-4 hardware consists of the following components:

- 16K of available Static Random Access Memory (RAM) and 32K Non-volatile Erasable Programmable Read Only Memory (EPROM).
- Two (2) Input-Output (I/O) Serial interface ports capable of the following operations:
 - async, byte sync, or bit sync
 - half or full duplex
 - up to 19.2 bit per second data transfer
 - automatic CRC generation and checking (CRC-16 or CCITT-16)
 - 8 bit address recognition
 - automatic zero bit insertion and deletion
 - Data Terminal Equipment (DTE) or Data Communication Equipment (DCE) operations
 - NRZI, TDI or RS232C
- Power, Data Send/Receive, and signal visual LED Indicators
- 6809 Microprocessor control
- 6 switch banks for changing RS232, NRZI, and TDI pin assignments of the serial ports
- 2 switch banks for option selections.

The A/S-4 is a 3274 work-alike controller emulating a PU2 with one LU2 terminal and one LU1 or LU3 printer. This allows an ASCII terminal or micro computer to emulate a 3278 CRT with a 3278 printer. The A/S-4 will also emulate SNA/SDLC 3776 or 3777 work station with one LU1 console, printer, card reader, card punch, or disk. It should be noted here that for purposes of simplicity this manual refers to CRTs and PCs with the generic acronym VDU: Visual Display Unit.

Either port may be configured as data terminal equipment (DTE) or data communications equipment (DCE). This gives the system designer great flexibility in determining what type devices he will use and where the A/S-4 can be installed.

The A/S-4 is designed to ease installation by the end user. Most of A/S-4's operating parameters (address, baud rate, ID, word structure, video display type) are "SOFT." They may be changed from the keyboard using "Friendly" menus to step you through the set up procedure. Once programmed, the A/S-4 retains its settings in non-volatile memory until changed by the user.

2. Specifications

Standard and Nonstandard Baud Rates: 50, 75, 110, 134, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600, 19.2 kbps

Connectors: All ports: DB25 (25-pin female)

Indicators: Power
Terminal Transmit Data
Terminal Receive Data
Terminal Carrier Detect
Terminal Clear-to-Send
Modem Transmit Data
Modem Receive Data
Modem Carrier Detect
Modem Clear-To-Send
Error

Environmental: Operating Temperature: 32 to 122°F (0 to 50°C); Storage Temperature: -13 to +158°F (-25 to +70°C)

Humidity: Up to 95% relative humidity without condensation

Power: 99–130 VAC or 200–230 VAC with a special order transformer 50 or 60 Hz. with 5% tolerance
Less than 10 watts of power consumption

Size: 1.5"H x 6.5"W x 8.25"D (3.8 x 15.2 x 21 cm)

Weight: 3 lb. (1.36 kg), includes frame and cover

3. Installation

3.1 General Installation

The A/S-4's options are set by the operator through the use of menus and switches. The A/S-4 provides a very flexible package of options so as to work with any terminal or terminal emulating device (such as a personal computer). Due to the great numbers of options provided, it may take a little time to set up the A/S-4 unit, however once complete, the options need not be set up again. All options are battery protected for when the unit is turned off.

The A/S-4 uses external switches and easy to use menu driven Set up features.

The A/S-4 is shipped from the factory ready to run with no changes if a DTE device (VDU, Personal Computer, etc.) is attached to the A/S-4's terminal port and the A/S-4's modem port is connected to a synchronous modem for dial up SDLC. If this is not your application, only a few switches need be changed. Refer to Section 4.0 for switch settings of other devices.

To install the A/S-4:

1. Connect cables to devices.
2. Plug in the A/S-4.
3. Type "S" on VDU for automatic speed detection of 300, 1200, 1800, 2400, 4800, or 9600 baud to obtain A/S-4 menus.
4. Follow A/S-4's menus.

If you have an odd baud rate not listed, refer to Section 4.0 for setting switches for terminal baud rate. If the menus do not appear, refer to Section 13.0 for trouble shooting problems and odd installations.

3.2 Modem Interface

The modem port can be configured for several types of hardware communications. The A/S-4 is shipped with the options set for the RS232C EIA standard. The modem port can be configured for NRZI for some IBM installations by setting the switch on the rear of the A/S-4 unit to the NRZI position.

3.3 Terminal Automatic Speed Detection

The A/S-4 has the necessary hardware and software for speed detection on the terminal port. This option makes it possible to install a A/S-4 without changing a switch. Baud rates of 300, 1200, 1800, 2400, 4800, or 9600 can be detected on power up of the unit. After applying power, the operator types "S" or SNA on the terminal and the baud rate of the VDU is detected and a power up message is sent to the terminal. The "S" may be in lower or upper case, even, odd, or no parity. Switch 5 of switch bank S9 must be OFF to enable this feature to work properly. The A/S-4 is shipped with this feature ready to work.

3.4 Power Transformer

The A/S-4 is shipped with a transformer for the standard USA 110-VAC outlet plug. A substitute transformer may be ordered for the for 220 VAC or other voltages. A conversion plug for different power outlets is the responsibility of the purchaser.

3.5 Synchronizer

The A/S-4 has a unique feature on the modem port to allow the A/S-4 to run SDLC over asynchronous modems, therefore providing a low cost dial up system. This is possible by the use of a hardware synchronizer circuit that derives clocks from the data. To use this feature, set the modem port switches as listed in Section 4.0 for an Asynchronous Modem.

4. Switches

The A/S-4 is equipped with 8 banks of DIP switches, all of which are accessed from the bottom of the unit. The general functions of these switches are as follows:

Terminal Interface Configuration	SW2, SW3, SW6
Terminal Speed	SW6
Modem Interface Configuration	SW4, SW5, SW7
Terminal Data Formats & Options	SW9
Special Printer Interface	SW8

NOTE

When any switches are changed, the A/S-4 must be powered off and on for the new switch settings to take effect.

4.1 Terminal Switches

Terminal port switches for Female DB25 Terminal Connector

Switch Bank S2, Switch:

- 1-On connects pin 4 of connector to A/S-4's input of CLEAR-TO-SEND
- 2-On connects pin 5 of connector to A/S-4's input of CLEAR-TO-SEND, for attaching DCE device
- 3-On connects pin 11 of connector A/S-4's input of CLEAR-TO-SEND, for printers with busy on pin 11
- 4-On connects pin 19 of connector to A/S-4's input of CLEAR-TO-SEND, for printers with busy on pin 19
- 5-On connects pin 20 of connector to A/S-4's input of CLEAR-TO-SEND, for devices with busy on pin 20
- 6-On connects pin 6 of connector to A/S-4's input of CARRIER DETECT
- 7-On connects pin 8 of connector to A/S-4's input of CARRIER DETECT
- 8-On connects pin 15 of connector to A/S-4's input of TRANSMIT CLOCK for Synchronous operation

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Switch Bank S3, Switch:

- 1-On connects pin 2 of connector to A/S-4's output of Transmit Data, for attaching DCE devices
- 2-On connects pin 3 of connector to A/S-4's output of Transmit Data, for attaching DTE devices
- 3-On connects pin 2 of connector to A/S-4's input of Receive Data, for attaching DTE devices
- 4-On connects pin 3 of connector to A/S-4's input of Receive Data, for attaching DCE devices
- 5-On connects pin 4 of connector to A/S-4's output of REQUEST-TO-SEND, for attaching DCE devices
- 6-On connects pin 5 of connector to A/S-4's output of REQUEST-TO-SEND
- 7-On connects A/S-4's REQUEST-TO-SEND to A/S-4's CLEAR-TO-SEND so that no external signals are needed. Used for Burroughs TDI and non-hardware throttle devices
- 8-On connects pins 4 and 5 of connector so external devices throttle itself

Switch Bank S6, Switch:

- 1-On supplies internal clocking for A/S-4's input of Transmit Clock
- 2-On connects pin 17 of connector to A/S-4's input of Receive Clock, for synchronous operation
- 3-On supplies internal clocking for A/S-4's input of Receive Clock
- 4-On connects pin 20 of connector to A/S-4's output of DATA-TERMINAL-READY, for attaching DCE devices
- 5-On connects pin 20 of connector to A/S-4's input of CARRIER DETECT
- 6-For modem port, see Modem Switches
- 7, 8, 9 and 10 - Set up terminal baud rate, if speed detection is turned off.

7	8	9	10	BAUD RATE
ON	ON	ON	ON	50
ON	ON	ON	OFF	75
ON	ON	OFF	ON	110
ON	ON	OFF	OFF	134.5
ON	OFF	ON	ON	150
ON	OFF	ON	OFF	300
ON	OFF	OFF	ON	600
ON	OFF	OFF	OFF	1200
OFF	ON	ON	ON	1800
OFF	ON	ON	OFF	2000
OFF	ON	OFF	ON	2400
OFF	ON	OFF	OFF	3600
OF	OFF	ON	ON	4800
OFF	OFF	ON	OFF	7200
OFF	OFF	OFF	ON	9600
OFF	OFF	OFF	OFF	19.2K

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4.2 How to Set Terminal Port Switches for Different Devices

DEVICES

VDU or DTE	Async Modem or DCE device	Centronics Printer (Busy on 20)	Tally printer Data Products (Busy on 19)	"Y" VDU, Printer Cable
Switch 2	Switch 2	Switch 2	Switch 2	Switch 2
1 OFF	1 OFF	1 OFF	1 OFF	1 OFF
2 OFF	2 ON	2 OFF	2 OFF	2 OFF
3 OFF	3 OFF	3 OFF	3 OFF	3 ON
4 OFF	4 OFF	4 OFF	4 ON	4 OFF
5 ON	5 OFF	5 ON	5 OFF	5 OFF
6 ON	6 ON	6 ON	6 ON	6 OFF
7 ON	7 ON	7 ON	7 ON	7 OFF
8 OFF	8 OFF	8 OFF	8 OFF	8 OFF
Switch 3	Switch 3	Switch 3		Switch 3
1 OFF	1 ON	1 OFF		1 OFF
2 ON	2 OFF	2 ON		2 ON
3 ON	3 OFF	3 ON		3 ON
4 OFF	4 ON	4 OFF		4 OFF
5 OFF	5 ON	5 ON		5 OFF
6 ON	6 OFF	6 OFF		6 ON
7 OFF	7 OFF	7 OFF		7 OFF
8 OFF	8 OFF	8 OFF		8 OFF
Switch 6	Switch 6	Switch 6		Switch 6
1 ON	1 ON	1 ON		1 ON
2 OFF	2 OFF	2 OFF		2 OFF
3 ON	3 ON	3 ON		3 ON
4 OFF	4 ON	4 OFF		4 OFF
5 ON	5 OFF	5 ON		5 ON
OKIDATA Products (Busy on 11)				
Switch 2				Switch 8
1 OFF				9 ON
2 OFF				10 ON
3 ON				
4 OFF				
5 OFF				
6 ON				Switch 9
7 ON				
8 OFF				4 OFF

SW6/ 7 8 9 10 BAUD RATE

ON	ON	ON	ON	50
ON	ON	ON	OFF	75
ON	ON	OFF	ON	110
ON	ON	OFF	OFF	134.5
ON	OFF	ON	ON	150
ON	OFF	ON	OFF	300
ON	OFF	OFF	ON	600
ON	OFF	OFF	OFF	1200
OFF	ON	ON	ON	1800
OFF	ON	ON	OFF	2000
OFF	ON	OFF	ON	2400
OFF	ON	OFF	OFF	3600
OFF	OFF	ON	ON	4800
OFF	OFF	ON	OFF	7200
OFF	OFF	OFF	ON	9600
OFF	OFF	OFF	OFF	19.2K

NOTE: Baud Rate selection has no effect if Terminal Speed Detect is selected.

4.3 Modem Switches

Modem port switches for Female DB25 Modem Connector

Switch Bank S4, Switch:

- 1-On connects pin 4 of connector to A/S-4's input of CLEAR-TO-SEND
- 2-On connects pin 5 of connector to A/S-4's input of CLEAR-TO-SEND, for attaching DCE devices
- 3-On connects pins 25 on both terminal and modem connectors to +5 volts DC.
- 4-On connects pin 19 of connector to A/S-4's input of CLEAR-TO-SEND, for printers with busy on pin 19
- 5-On connects pin 20 of the connector to A/S-4's input of CLEAR-TO-SEND, for devices with busy on pin 20
- 6-On connects pin 6 of connector to A/S-4's input of CARRIER DETECT
- 7-On connects pin 8 of connector to A/S-4's input of CARRIER DETECT
- 8-On connects pin 15 of connector to A/S-4's input of Transmit Clock for synchronous operation

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Switch Bank S5, Switch:

- 1-On connects pin 2 of connector to A/S-4's output of Transmit Data, for attaching DCE devices
- 2-On connects pin 3 of connector to A/S-4's output of Transmit Data, for attaching DTE devices
- 3-On connects pin 2 of connector to A/S-4's input of Receive Data, for attaching DTE devices
- 4-On connects pin 3 of connector to A/S-4's input of Receive Data, for attaching DCE devices
- 5-On connects pin 4 of connector to A/S-4's output of REQUEST-TO-SEND, for attaching DCE devices
- 6-On connects pin 5 of connector to A/S-4's output of REQUEST-TO-SEND
- 7-On connects A/S-4's REQUEST-TO-SEND to A/S-4's CLEAR-TO-SEND so that no external signals are needed. Used for Burroughs TDI and non-hardware throttle devices
- 8-On connects pins 4 and 5 of connector so external devices throttle itself

Switch Bank S7, Switch:

- 1-On supplies internal clocking for A/S-4's input of Transmit Clock
- 2-On connects pin 17 of connector to A/S-4's input of Receive Clock, for synchronous operation
- 3-On supplies internal clocking for A/S-4's input of Receive Clock
- 4-On connects pin 20 of connector to A/S-4's output of DATA-TERMINAL-READY, for attaching DCE devices
- 5-On connects pin 20 of connector to A/S-4's input of CARRIER DETECT
- 6-On supplies 1X clock for internal modem port use
7, 8, 9 and 10 reserved

Switch Bank S6, Switch:

- 6-On supplies 16X clock for internal modem port use, for synchronization of synchronous data over async modems

4.4 How to Set Modem Port Switches for Different Devices

DEVICES

ASYNC MODEM	SYNC MODEM	FRONT END PROCESSOR
Switch 4	Switch 4	Switch 4
1 OFF	1 OFF	1 OFF
2 ON	2 ON	2 OFF
3 OFF	3 OFF	3 OFF
4 OFF	4 OFF	4 OFF
5 OFF	5 OFF	5 ON
6 ON	6 ON	6 ON
7 OFF	7 OFF	7 ON
8 OFF	8 ON	8 ON
Switch 5	Switch 5	Switch 5
1 ON	1 ON	1 OFF
2 OFF	2 OFF	2 ON
3 OFF	3 OFF	3 ON
4 ON	4 ON	4 OFF
5 ON	5 ON	5 OFF
6 OFF	6 OFF	6 OFF
7 OFF	7 OFF	7 OFF
8 OFF	8 OFF	8 ON
Switch 6	Switch 6	Switch 6
6 ON	6 OFF	6 ON
Switch 7	Switch 7	Switch 7
1 ON	1 OFF	1 ON
2 OFF	2 ON	2 ON
3 ON	3 OFF	3 ON
4 ON	4 ON	4 OFF
5 OFF	5 OFF	5 ON
6 OFF	6 OFF	6 OFF
Switch 9	Switch 9	Switch 9
9 OFF	9 OFF	9 OFF
10 OFF	10 OFF	10 OFF

NOTE

Modem port baud rate is selected byH- application options menu.

4.5 Option Switches

Switch Bank S8, Switch:

- 1-RESERVED
- 2-RESERVED
- 3-RESERVED
- 4-RESERVED
- 5-RESERVED
- 6-RESERVED
- 7-RESERVED
- 8-RESERVED

9-On connects pins 9 on both terminal and modem connectors to +10 Volts DC.

10-On connects pins 10 on both terminal and modem connectors to -10 Volts DC.

Switch Bank S9, Switch:

Switch Number	Function	Switch ON	Setting OFF
1	Terminal Port Data Bits	* 7	8
2	Reset Default Options on Reset	NO	YES
3	Single or Multi LU	Multi	Single
4	VDU/Printer "Y" Interface	* Disable	Enable
5	Terminal Speed Detection	DISABLE	ENABLE *
6	Option Change on Power Up	* YES	NO
7	Terminal Parity Type	Odd	Even *
8	Terminal Parity	DISABLE	ENABLE *
9	TDI Transmit	ENABLE	DISABLE
10	TDI Receive	ENABLE	DISABLE *

* = Factory Setting

5. LED Indicator

The front of A/S-4 enclosure provides 10 light emitting diodes (LED) indicators. The indicators are arranged and labeled in the following order, from left to right.

TTX	Terminal Transmit Data
TRX	Terminal Receive Data
TCD	Terminal Carrier Detect
TCTS	Terminal Clear To Send
ERROR	Error Condition
POWER	Power On
MCTS	Modem Clear to Send
MCD	Modem Carrier Detect
MRX	Modem Receive Data
MTX	Modem Transmit Data

TTX	Flashes as data is transmitted by the A/S-4 out the terminal port.
TRX	Flashes as data is received by the A/S-4 from the terminal port.
TCD	Lights when the A/S-4's input of Carrier Detect is high on the terminal port. This light must be on while TRX is flashing for A/S-4 to process received data.
TCTS	Lights when the A/S-4's input of Clear to Send is high on the terminal port. This light must be on for the A/S-4 to transmit data on the terminal port.
ERROR	Error Condition Exists - Memory error, bad received block check, or buffer overflow.
POWER	Lights when the A/S-4 is plugged in and the +5 Volt power supply is ok.
MCTS	Lights when the A/S-4's input of Clear to Send is high on the modem port. This light must be on for the A/S-4 to transmit data on the modem port.
MCD	Lights when the A/S-4's input of Carrier Detect is high on the modem port. This light must be on while the MRX is flashing for the A/S-4 to process received data
MRX	Flashes as data is received by the A/S-4 from the modem port.
MTX	Flashes as data is transmitted by the A/S-4 out the modem port.

6. Power Up and Configuration Menu Operations

The A/S-4 unit options are mainly set by the operator through the use of menus. The A/S-4 provides a very flexible package of options so to allow any VDU to operate like an IBM 3278 terminal and an IBM 3287 printer or a 3770 work station. Because of the great numbers of options provided, it may take a little time to set up to A/S-4 unit, but once complete, the options need not be set up again. All options are battery protected for when the unit is turned off.

6.1 Power Up

To start installing your A/S-4 unit only the VDU need be connected. Connect to VDU, making sure all the following steps have been followed.

1. Plug in, turn on, boot, or perform any other needed operation to ready the VDU.
2. Set switches SW2, SW3, SW6 on A/S-4 for type of VDU connecting to, see Section 4.2 How to set Terminal Switches for different devices. The factory default switch settings are for a VDU DTE device.
3. Set SW9 for communication options needed, refer to Section 4.5 Option Switches. The factory default switch settings are for 7 data bits, speed detection ON, menu operation ON, even parity. Be sure that SW9/6 is in the ON position: Option change on power up enabled.
4. Plug the power transformer into any standard 110 volt AC power outlet. Plug the connector on the other end of the power cord into the mating connector on the back of the unit. Insert the connector so the small beveled lip faces up for ease of insertion. The beveled lip can be inserted up or down and the unit will work fine with no harm to the A/S-4. A substitute transformer may be ordered for the A/S-4 unit for 220 volts AC or other voltages.
5. Plug an RS232-C cable from the VDU into the terminal connector on the back of the A/S-4. Pins 2-8 and 20 are required.
6. Plug an RS232-C cable from the modem or IBM host into the modem connector. Pins 2-8, 15, 17 and 20 are required.

After the above procedure has been completed, the A/S-4 should have three lights on, the power, TCTS, and TCD. If these lights are not all on the A/S-4 unit will not communicate with the VDU host properly. Refer to Section 11.0 Trouble Shooting Problems and Odd Installation Problems if all three lights will not come on.

With all three lights on, the A/S-4 is waiting for the letter "S" from the VDU for auto speed detection if the option is enabled. The operator types lower or upper case "S" and the A/S-4 will calculate the baud rate and send out a power up message. The A/S-4 is capable of detecting baud rates of 300, 1200, 1800, 2400, 4800 and 9600. If the speed detect option is off, the A/S-4 will send out the power up message two or three seconds after the three lights come on at the baud rate set by switches SW6 (refer to Section 4.1 Terminal Switches). If the power up message does not look like Figure 1, check the option switch SW9 or refer to Section 13.0 Trouble Shooting Problems and Odd Installation Problems. If the message "MEMORY ERROR U13 or U14" is displayed, refer to section 13 to determine if the A/S-4 is defective.

6.2 Power Up Message

The A/S-4 sends out the message in Figure 1 on power up or the raising of DTR (DATA TERMINAL READY) on the terminal device. This message informs the operator that the A/S-4 is ready to try to match the operator's terminal or terminal emulation package with the VDU (VISUAL DISPLAY UNIT) list in the memory. The operator may now type the "HOME" key on his/her terminal so that the A/S-4 may match the VDU device with the internal VDU list so that the clear screen, home cursor, position cursor commands, etc. to the VDU will be correct. If no match occurs, the A/S-4 defaults to the IBM 3101 VDU command set. This is not a problem if your VDU is not an IBM 3101, as you may change the VDU by the use of menus. If your terminal does not have a home key, you may hit the space bar and set up the VDU by the menus. Hitting the space bar leaves the internal VDU the same as the last VDU used with the A/S-4. After typing "space" or "HOME" the A/S-4 will output the A/S-4's main menu. If a VDU match did occur, the screen will clear before the main menu is displayed, otherwise the VDU device will scroll.

A/S-4
Type Home for VDU Match or Space
(version 01-030986)

Figure 1

The version number in Figure 1 reveals the current firmware level executing in the A/S-4. In this example the firmware is level 1 of program on date 3/03/86.

6.3 A/S-4 Main Menu

A set of menus are used to configure the A/S-4's options so that it will operate properly with the particular VDU and host to which it is connected. In order to access these menus, SW9/6 must be in the ON position (see Section 4.5). All options are stored in battery-protected RAM so that they need not be reconfigured in the event of interruption of AC power to the unit.

At the beginning of every A/S-4 menu are the current main three options, the application, VDU and keyboard. The application option informs you of which keyboard layout the A/S-4 will use when running SDLC/SNA.

The A/S-4 Main Menu is shown in Figure 2. This menu coordinates the changing of the many A/S-4 options into main categories, VDU Selection, VDU commands, VDU video commands, keyboard selection, keys on keyboard arrangement, application, application options, printer options and verification of switch settings.

```
CURRENT:
Application = SDLC/SNA 3274/76 Interactive
VDU = ANSI STD; DEC VT100; Teletype 5410, 5420; Televideo 970, 960
Keyboard = Standard

PROTOCOL CONVERTER MAIN MENU

A-RUN (NO CHANGES)
ELSE CHANGE :
B-VDU
C-VDU Commands
D-VDU Video Commands
E-Keyboard
F-Keys arrangement
G-Application
H-Application Options
I-Printer Options
J-Verify Switch Settings
K-Reload Default Options

Enter Letter:
```

Figure 2

CHAPTER 6: Power Up and Configuration Menu Options

The input allowed at this menu is one letter A thru J so to run or change an option. Listed below is a brief description of what each letter gives you access to, refer to the section listed for more details.

Letter	Section	Description
A	6.4	Run A/S-4 as options are currently set.
B	6.5	Change internal A/S-4 VDU type to match terminal device. Changes table of VDU video commands used by A/S-4.
C	6.6	Change commands sent to VDU to perform functions like Home, Clear, etc.
D	6.7	Turn on or off video. Also change video commands.
E	6.8	Change to different type keyboard arrangements.
F	6.9	Arrange keys in desired order on keyboard.
G	6.10	Change between applications, Interactive or Batch mode of data transfer.
I	6.12	Printer Options
J	6.13	Verify switch settings
K	6.14	Set all A/S-4 options to default values.

6.4 Switching from A/S-4's Main Menu to Running the Application

Once all operating parameters have been configured properly, the A/S-4 is ready to run. To connect the asynchronous devices to the application, enter the letter "A" for the RUN option of the A/S-4's Main Menu. The A/S-4 will then proceed to connect up to the application in one of the following manners depending on which of the three states the host communication line is in:

1. Modem not ready; if the modem is turned off or on a dial up line the modem has not been dialed or on a lease line the line is down, the A/S-4 will display on the VDU "DIAL UP SDLC LINE". Once the phone line connection with the host has been establish the A/S-4 will proceed to one of the following two states. Refer to Section 13.0 on Trouble Shooting if the Dial Up message will not go away for more information.

2. Modem connected to host but LU inactive; if the LU is inactive the A/S-4 will display "WAITING FOR LU TO COME ACTIVE". The LU should come active after a few seconds of this message appearing on the VDU. If the LU does not come active, then one of the following problems may exist:
 - A. Host is not polling PU (Physical Unit) Solution: Have a network operator activate the PU and maybe the line also.
 - B. PU address (or station address) is incorrect Solution: Return to A/S-4 menus and change PU address.
 - C. LU address is incorrect Solution: Return to A/S-4 menus and change LU address.

After the LU comes Active, the A/S-4 will proceed to the following state. Refer to Section 13.0 on Trouble Shooting if the LU will not activate for more information.

NOTE

In states 1 and 2 typing any key will return A/S-4 to it's Main Menu

3. Application running:

Interactive - The A/S-4 will refresh the VDU's screen with the last screen received from the host (which could be blank). Operation will then function as a 3278 CRT.

Batch - The A/S-4 will display the status of the LU on the status line but no previous data from the system will be displayed on the VDU. Operation will then function as a 3770 work station.

6.5 Changing the VDU Type

If the current VDU type displayed at the top of the A/S-4 Main Menu does not match the VDU or VDU emulation package you have connected to the A/S-4, you may change the VDU type by entering the letter “B” in response to the Main Menu. The change VDU Menu will then be displayed on your screen as in Figure 3. If your screen is scrolling A/S-4 menus instead of clearing the screen before each menu, then you should change the VDU type. The change VDU menu allows you to match your VDU with one of the A/S-4’s fixed VDU types or to create a new A/S-4 VDU type. The A/S-4 feature for creating a new VDU type allows A/S-4 to work with any asynchronous device with screen capabilities.

```

CURRENT:

Application = SDLC/SNA 3274/76 Interactive
VDU = ANSI STD; DEC VT100; Teletype 5410, 5420; Televideo 970, 960
Keyboard = Standard

Change: VDU

1 or A-Exit
2-Change Current Name
3-Add Name
4-Delete

PROGRAMMABLE:      FIXED:
A-                 F-IBM 3101; DEC VT52
B-                 G-ANSI STD: DEC VT100; Teletype 5410,5420; Televideo 970,960
C-                 H-Televideo 910 thru 950; Zentec Zephyr
D-                 I-Lear Siegler ADM3A
E-                 J-IBM PC 3270

Enter Number:

```

Figure 3

The change VDU menu allows 4 operations as described below:

1. Exit - By entering the number 1 or the letter A the A/S-4 will return to the Main Menu with the VDU type currently at the top of the screen.
2. Change current VDU type at top of screen - By entering the number 2, the operator may change the VDU type. The A/S-4 will then display “ENTER LETTER:” so that the operator may select the letter preceding the desired VDU type from the list of programmable and fixed VDU types. Fixed VDU types have the VDU commands characters hard coded into the A/S-4’s firmware and require that your VDU or VDU emulator match those commands character for character. Programmable VDU types have VDU command characters stored in battery protected memory so that command characters in the A/S-4 can be changed to match the operator VDU or VDU emulator that is not exactly like any of the Fixed VDU types. After the operator enters the desired letter (A thru J), the menu will redisplay with the new VDU type at the top of the screen using the new command character set of the selected VDU.

NOTE

Selection of a blank programmable VDU type may cause erroneous command characters to be sent to the operators VDU. The programmable VDU type should be added by option 3 before it is selected.

3. Add or Change Name - by entering a 3 the operator is able to add a name to or change a name from the "PROGRAMMABLE" column see figure 4. This is done when the operator's VDU does not match one of the "FIXED" VDU's and it allows him to define to the A/S-4 the various commands his VDU needs to operate properly (e.g., the command from the A/S-4 which will cause his VDU to clear the screen). In the example shown in figure 4, the operator has given the name "NEW VDU" to VDU A. Operator input is underlined. The 10 characters are filled out with spaces or just type carriage return. By typing the letter "H", he has copied the characteristics of VDU H into those of "NEW VDU". The "CURRENT" header will now show the VDU as "NEW VDU". Using the VDU commands menu (selection C on the Main Menu) he can now change the clear screen command (or any other command) from the command copied from VDU H to whatever "NEW VDU" needs (these commands may be found in the NEW VDU manual).
4. Delete Name - By entering a 4 the operator can delete a name from the "PROGRAMMABLE" VDU list.

Enter Number: 3 Enter Letter A

Enter A 10 Character Name: NEW VDU

Make New NEW VDU Name Look like established Name: (Enter Letter) H

CURRENT:

Application = SDLC/SNA 3274/76 Interactive

VDU = NEW VDU

Keyboard = Standard

Change: VDU

1 or A-Exit

2-Change Current Name

3-Add or Change Name

4-Delete

PROGRAMMABLE:

FIXED

A-NEW VDU

F-IBM 3101; DEC VT52

B-

G-ANSI STD; DEC VT100; Teletype 5410, 5420; Televideo 970, 960

C-

H-Televideo 910 thru 950; Zwnotec Zepher

D-

I-Lear Siegler AND 3A

E-

J-IBM PC 3270

Figure 4

6.6 Changing VDU Commands for the VDU Type Selected

By selecting item C from the main menu (Section 6.3), the operator obtains the menu shown in figure 5. Items from this menu can only be changed for programmable VDUs. This menu allows you to define the video commands our VDU expects. You should consult your VDU users manual to determine what the command characters are for the various VDU functions.

```

CURRENT:
Application = SDLC/SNA 3274/76 Interactive
VDU = NEW VDU
Keyboard = STANDARD

Change CMD VDU Responds to for:

A-Exit
B-ESC          VDU CMD to Follow (Set up 1st!!!)
C-ESC `       Data to Printer:      ON
D-ESC a       Data to Printer:      OFF
E-ESC `       Data to Card:         ON
F-ESC a       Data to Card:         OFF
G-ESC `       Data to Disk:         ON
H-ESC a       Data to Disk:         OFF
I-ESC *       Clear Screen
J-CTL ^       Home
K-ESC =       Cursor Position: Start Char
L-            Row Offset Value
M-CTL @       Row/Col Separator
N-            Column Offset Value
O-CTL @       Final Char
P-NO         Decimal Row/Col Values

Enter Letter:
    
```

Figure 5

Figure 6 gives an example of how the operator would enter a new Home Cursor command to match his VDU. Operator input is underlined.

```

Enter Letter: J Enter CMD: CTL Y
    
```

Figure 6

To disable the two character Printer, Card or Disk on/off command, enter a space for the command, also use a space to terminate the command.

6.7 Changing Video Attributes and Commands for VDU

The menu obtained by selecting item D of the main menu is shown in Figure 7. This menu allows the operator to define the parameters which will give the proper video highlighting to the fields on the VDU screen.

```
CURRENT:
Application = SDLC/SNA 3274/76 Interactive
VDU = NEW VDU
Keyboard = STANDARD

Cmd chars for different VDU video displays for different type fields
A-Exit
B-Start of video cmd: CTL [
C-End of video cmd:
D-Video cmd takes up a space on VDU?N

Middle of cmd:      For Data Type of:

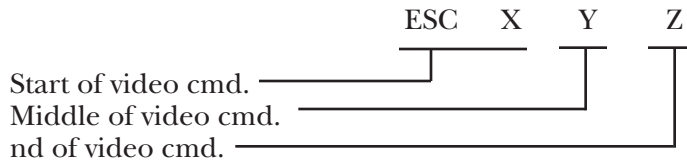
E-(=UNPROTECTED, ALPHANUMERIC, LOW INTENSITY
F-(=UNPROTECTED, ALPHANUMERIC, HIGH INTENSITY
G-(=UNPROTECTED, NUMERIC, LOW INTENSITY
H-(=UNPROTECTED, NUMERIC, HIGH INTENSITY
I-)=PROTECTED, ALPHANUMERIC, LOW INTENSITY
J-)=PROTECTED, ALPHANUMERIC, HIGH INTENSITY
K-)=PROTECTED, NUMERIC, LOW INTENSITY
L-)=PROTECTED, NUMERIC, HIGH INTENSITY
M-(=NONDISPLAY & NONPRINT

Enter Letter:
```

Figure 7

The host CPU can send commands to its terminals to define how the video display will be printed. An example is a display using highlighted areas for data entry. The A/S-4 can perform this type of display presentation for almost any terminal. In operation the A/S-4 intercepts the host video commands and translates them into the commands that the attached VDU needs to perform the function. If you are using special displays then you must use selections B, C and D to set up your display attributes. Consult your VDU users manual to determine which characters are used to create the type display you need and enter those characters in the fields as needed.

The general format of a video command to a VDU is as follows:



X, Y and Z represent ASCII characters. The end of video command may not be necessary and therefore displayed as a blank. Items B, C and E through M can be defined using the format shown above.

Item D differentiates between two techniques of video highlighting: 1) The video command occupies a space on the screen and defines the start of a video highlight field (e.g., Televideo 925). 2) The video command does not occupy a space and does determine the type of video highlight for all subsequent received characters, regardless of their positions on the screen (e.g., DEC VT100).

Video types referred to in figure 7 correspond to the video highlighting codes which are sent to the A/S-4 from the IBM host. It is up to the operator to enter the proper value for the middle of command to match (or mismatch, if desired) each video type.

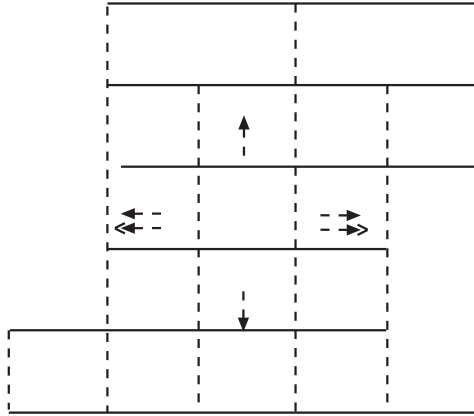
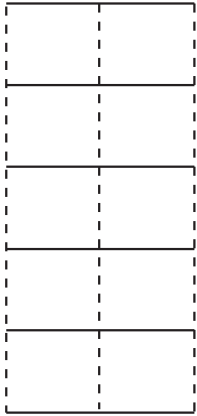
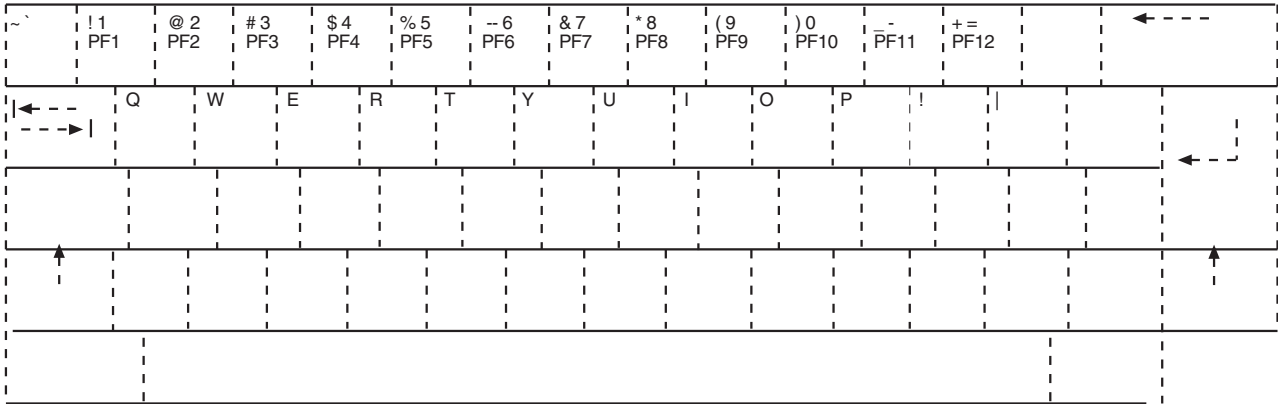
If no video highlighting is desired, the operator may turn off (prevent the A/S-4 from sending video commands) this feature by entering a space for Item B, start of video command. The A/S-4 assumes if there is no start command, than there is no video commands for the VDU.

PROTOCOL CONVERTER MODEL A/S-4

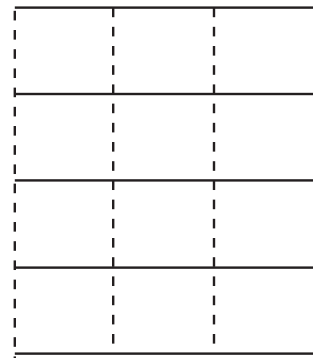
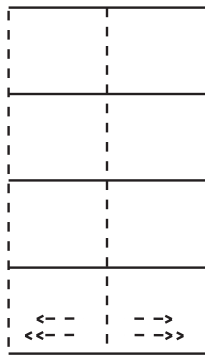
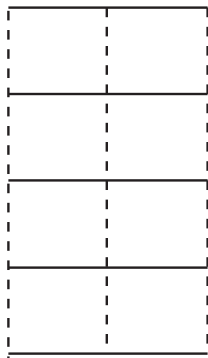
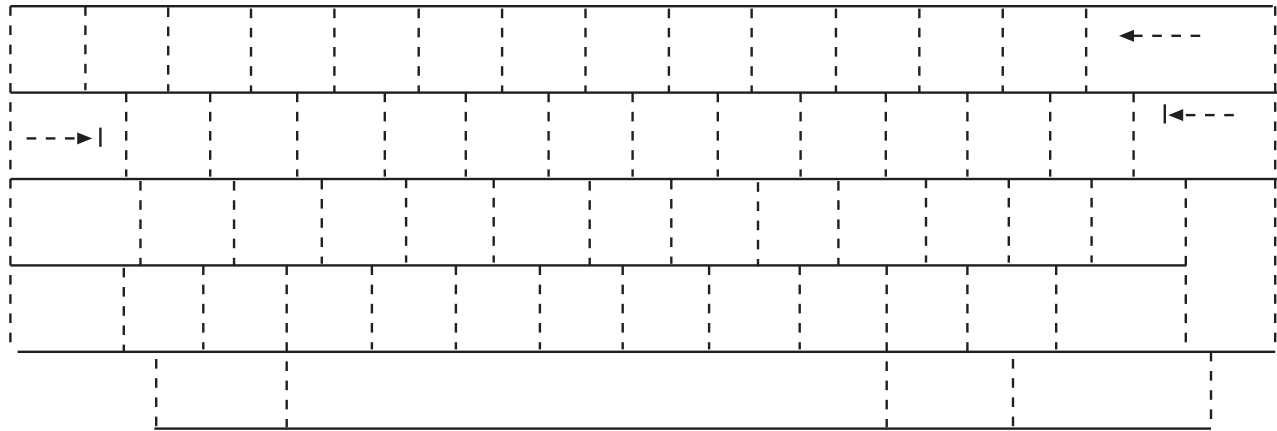
ESC DEL LINE	! 1	@ 2	# 3	\$ 4	% 5	^ 6	& 7	* 8	(9) 0	_ -	+ =	
TAB	Q PF1 DISC VDC	W PF2	E PF3 FIELD MARK	R PF4 DUP	T PF5	Y PF6	U PF7 UP ARROW	I PF8	O PF9 HOME	P PF10 CUR SEL	{ [}]	RETURN
CTRL	LOCK	A PF11 DUAL MONO	S PF12	D PF13 LOCAL PRINT	F PF14 PRINT	G PF15	H PF16	J PF17 NEW LINE	K PF18	L PF19	:: PF20	"	\
SHIFT		Z PF21 RESTR SNAP	X PF22 DISC SDLC	C PF23 DISC VDU	V PF24 RE DSPLY	B PA1	N PA2 DOWN ARROW	M PA3 ENTER	,		IDENT	?/ CENT	SHIFT
SPACE BAR													

BOLD PRINT = CONTROL CMDS
 NORMAL PRINT = ESCAPE CMDS

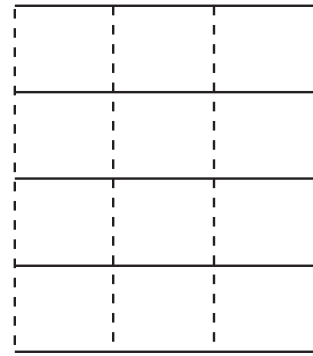
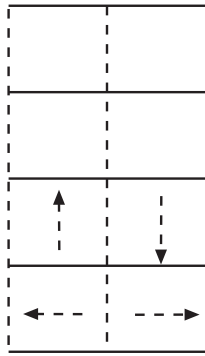
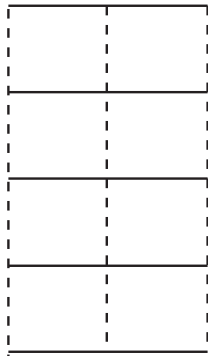
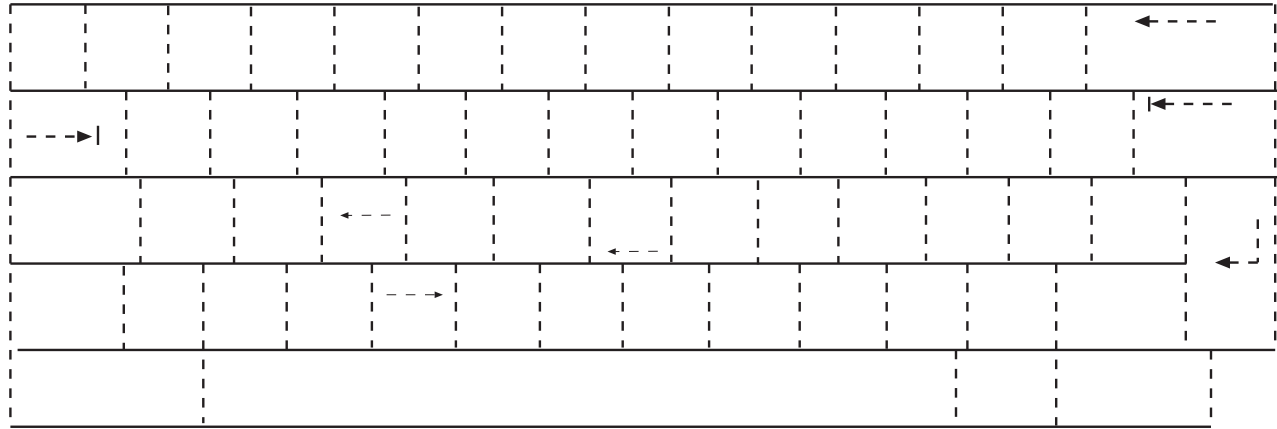
A/S-4 Standard Keyboard Layout



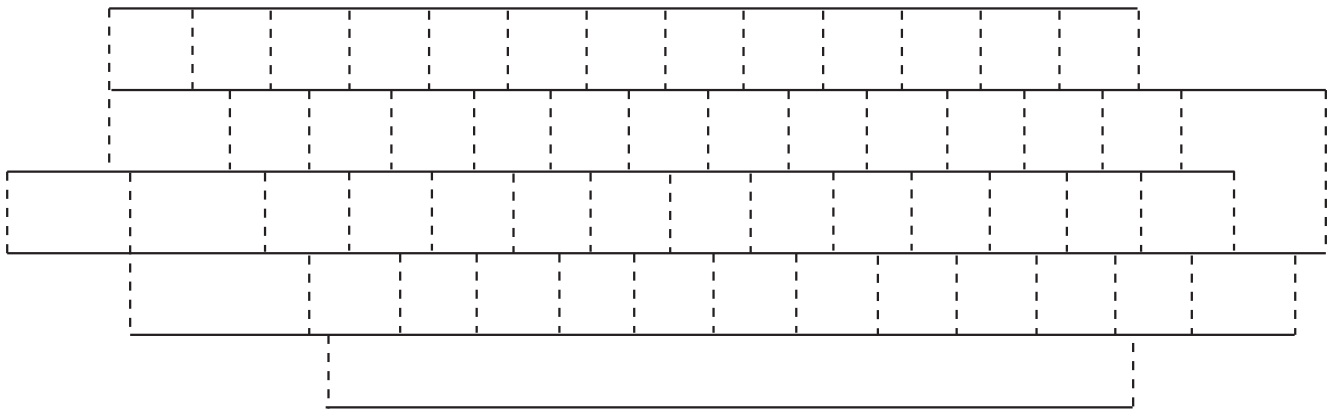
IBM PC Keyboard Layout



ADM 1178 Keyboard Layout



IBM 3101 Keyboard Layout



PNS Keyboard Layout

6.8 Changing Keyboard Layout Type

By selecting E from the main menu, the menu shown in Figure 8 is obtained. This is used to select the specific keyboard mapping the operator desires. Selection of F, G and H provide fixed keyboards shown on the previous pages. Programmable keyboards may be added as any of the selections A through E. By using a programmable selection, the operator can design the keyboard to his or her liking.

To change the keyboard used enter 2 then select the keyboard layout you desire from those listed.

If you prefer an unlisted keyboard type you should select one of the letters under programmable and enter the name (10 characters max). If the name is less than ten characters long, type carriage return or spaces to complete the ten character name. If your keyboard looks like one of the fixed keyboards then you should enter its letter as a response to “make new keyboard look like established name”.

NOTE

Selection of a blank entry from the programmable list may cause the A/S-4 to malfunction.

Names of programmable keyboards may be added, changed, or deleted by using selection 3 and 4.

If a programmable keyboard has been selected, the operator should now set up the keys arrangement as he or she wishes using selection F from the A/S-4's main menu.

```
CURRENT:
Application = SDLC/SNA 3274/76 Interactive
VDU = ANSI STD; DEC VT100; Teletype 5410, 5420; Televideo 970, 960
Keyboard = Standard

Change: Keyboard

1 or A-Exit
2-Change Current Name
3-Add Name
4-Delete

PROGRAMMABLE:      FIXED:
A-                  F-STANDARD
B-                  G-IBM PC 3270
C-                  H-ADM 1178
D-                  I-IBM 3101
E-                  J-PNS

Enter Number:
```

Figure 8

6.9 Changing Keys Arrangements on a Particular Keyboard Layout Type

Selection of item F from the main menu will cause the menu shown in Figure 9 to be displayed.

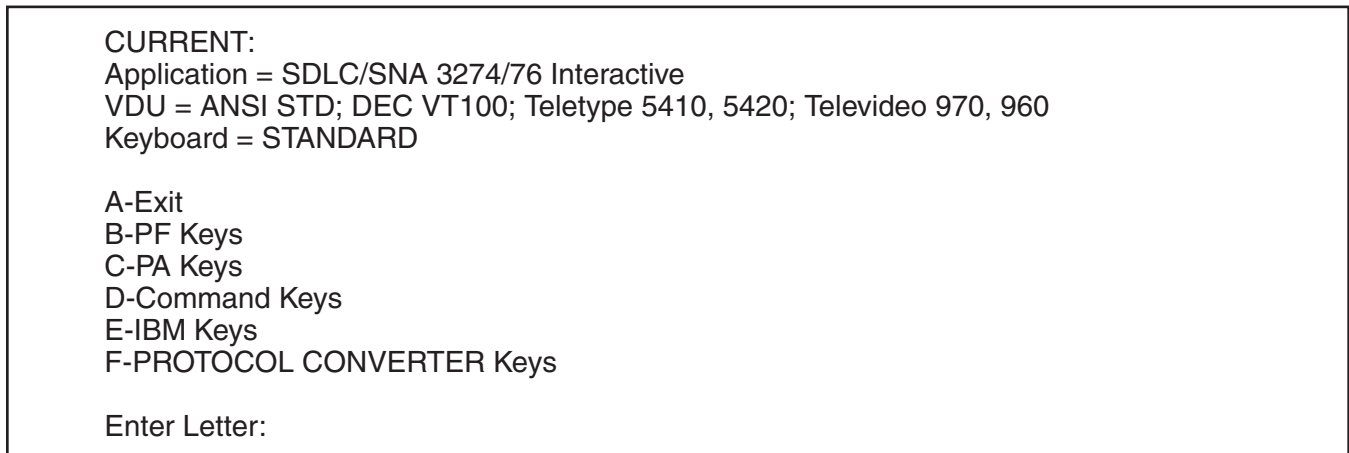


Figure 9

This menu allows for great flexibility in keyboard layouts. If you desire you may alter Key assignments or design your own keyboard layout. The selections available from this menu is as follows:

Exit	Go back to main menu
PF Keys	Programmable function keys
PA Keys	Programmable attention keys
Command Keys	Keys used for editing & cursor movement (e.g., Clear)
IBM Keys	Keys used to perform IBM terminal operations (e.g., Field Mark)
Protocol Converter Keys	Keys used to control the A/S-4's operation (e.g., Restart A/S-4, which will take operator back to main menu)

The keys arrangement can only be changed if the current keyboard is a programmable keyboard (see Section 6.8)

6.9.1 PF KEYS

Selection of item B from the menu shown in Figure 9 will cause the menu shown in Figure 10 to be displayed.

If the operator wants to use a different key for PF2, he would first enter the letter “C” and then enter the new value(s) in response to prompt(S) for the new value(s). The key sequences entered for the PF keys must be either control or escape sequences to work properly, and any specific key sequence must be entered for only one key. After a new value has been entered, the menu will be redisplayed and will show the new value(s).

CURRENT: Application = SDLC/SNA 3274/76 Interactive VDU = ANSI STD; DEC VT100; Teletype 5410, 5420; Televdeo 970, 960 Keyboard = STANDARD	
Change: PF Keys (Keys Typed on VDU to Perform Function)	
A-Exit	B-ESC Q or ESC q=PF1
C-ESC W or ESC w=PF2	D-ESC E or ESC e=PF3
E-ESC R or ESC r=PF4	F-ESC T or ESC t=PF5
G-ESC Y or ESC y=PF6	H-ESC U or ESC u=PF7
I-ESC I or ESC i=PF8	J-ESC O or ESC o=PF9
K-ESC P or ESC P=OF10	L-ESC A or ESC a=PF11
M-ESC S or ESC S=PF12	N-ESC D or ESC d=PF13
O-ESC F or ESC f=PF14	P-ESC G or ESC g=PF15
Q-ESC H or ESC h=PF16	R-ESC J or ESC j=PF17
S-ESC K or ESC k=PF18	T-ESC L or ESC l=PF19
U-ESC ; or =PF20	V-ESC Z or ESC z=PF21
W-ESC X or ESC x=PF22	X-ESC C or ESC c=PF23
Y-ESC V or ESC v=PF24	
Enter Letter:	

Figure 10

PROTOCOL CONVERTER MODEL A/S-4

6.9.2 PA KEYS

Selection of item C from the menu shown in figures 9 will cause the menu shown in figure 11 to be displayed. Keys changes are performed in the same manner as the PF key changes.

CURRENT:	
Application = SDLC/SNA 3274/76 interactive	
VDU = ANSI STD; DEC VT100; Teletype 5410, 5420; Televideo 970, 960	
Keyboard = STANDARD	
Change: PA Keys (Keys Typed on VDU to Perform Function)	
A-Exit	B-ESC B or ESC b=PA1
C-ESC N or ESC n=PA2	D-ESC M or ESC m=PA3
Enter Letter:	

Figure 11

6.9.3 COMMAND KEYS

Selection of item D from the menu shown if figure 9 will cause the menu shown in figure 12 to be displayed. Key changed are performed in the same manner as the PF key changes.

CURRENT:			
Application = SDLC/SNA 3274/76 Interactive			
VDU = ANSI STD; DEC VT100; Teletype 5410, 5420; Televideo 970, 960			
Keyboard = STANDARD			
Change: Command keys (Keys Typed on VDU to Perform Function)			
A-Exit	B-CTL I or	=Tab	
C-CTL Y or	=Back Tab	D-CTL J or CTL J	=New Line
E-CTL H or	=Back Space	F-CTL O or	=Home
G-ESC - or	=Clear	H-CTL H or	=Left Arrow
I-CTL G or	=Left 2 Arrow	J-CTL K or	=Right Arrow
K-CTL L or	=Right 2 Arrow	L-CTL U or	=Up Arrow
M-CTL N or	=Down Arrow	N-CTL M or	=Enter (Send)
O-ESC 9 or	=Attention		
Enter Letter:			

Figure 12

6.9.4 IBM KEYS

Selection of item E from the menu shown in figure 9 will cause the menu shown in figure 13 to be displayed. Key changes are performed in the same manner as the PF key changes.

CURRENT:			
Application = SDLC/SNA 3274/76 Interactive			
VDU = ANSI STD; DEC VT100; Teletype 5410, 5420; Televideo 970, 960			
Keyboard = STANDARD			
Change: IBM Keys (Keys on VDU to Perform Function)			
A-Exit		B-CTL T or	=Duplicate
C-CTL R or	=Field Mark	D-ESC 7 or	=Erase EOF
E-ESC 6 or	=Erase Input	F-ESC 5 or	=Insert Mode
G-ESC . or	=Ident	H-CTL P or	=Cursor Select
I-ESC M or	=Device Cancel	J-ESC 8 or	=System Request
K-ESC 0 or	=Reset		
Enter Letter:			

Figure 13

6.9.5 A/S-4 KEYS

Selection of item F from the menu shown in figure 9 will cause the menu shown in figure 14 to be displayed. Key changes are performed in the same manner as the PF key changes.

CURRENT:			
Application = SDLC/SNA 3274/76 Interactive			
VDU = ANSI STD; DEC VT100; Teletype 5410, 5420; Televideo 970, 960			
keyboard = STANDARD			
Change: Protocol Converter Keys (Keys on VDU to Perform Function)			
A-Exit		B-CTL Z OR	=Restart Protocol Converter
C-CTL C or	=Disc. VDU	D-CTL X or	=Disc. SDLC
E-CTL A or	=Dual or Mono Case	F-ESC / or	=Cent Key
G-CTL V or	=Redisplay Screen	H-CTL D or	=Local Print
I-CTL F or	=Stop/Start Print	J-ESC 2 or	=Line Insert
K-ESC I or	=Line Delete	L-ESC 4 or	=Char Insert
M-ESC 3 or	=Char Delete		
Enter Letter:			

Figure 14

PROTOCOL CONVERTER MODEL A/S-4

The functions of the A/S-4 Keys are as follows:

Restart Protocol Converter	Jump to A/S-4's main menu for option changes.
Disconnect VDU	Causes A/S-4 to drop DTR to device connected to terminal port. Used to disconnect a modem attached to the terminal port in a dial-up configuration
Disconnect SDLC	Causes A/S-4 to drop DTR to device connected to modem port. Used to disconnect a modem attached to the modem port in a dial-up configuration.
* Dual or Mono Case	Used to shift between Dual (Upper & Lower Case) and Mono (Upper Case only).
* Cent Key	Allows cent () key to be sent to IBM host since most VDU's do not have a cent key.
* Redisplay Screen	Used to redisplay current screen. Used when VDU is attached to terminal port through dial-up modem and garbage has been displayed on screen.
* Local Print	Print VDU screen on printer
* Stop/Start Print	Allows stopping of printer to align forms and then starting again.
* Line Insert	Causes a blank line to be inserted at cursor location.
* Line Delete	Causes a line of data to be deleted at cursor location.
* Character Insert	Causes a Null Character to be inserted at cursor location.
*Character Delete	Causes a data character to be deleted at cursor location.

*Keys used only during interactive application, not used in batch.

6.10 Changing Application

The A/S-4 is shipped from the factory to power up in the SDLC/SNA 3274/76 Interactive mode of operation. The current mode of operation can be determined by looking at the top of the main menu, as in Figure 14 (it is Interactive). To change to Batch operation, the operator types the letter G in response to the main menu. The main menu will then be redisplayed with "SDLC/SNA 3776/7 Batch" at the current application location on the main menu. To go back to interactive, type G again. The current mode of operation is protected in non-volatile RAM, so that on power up it will return to the last operating state.

6.11 Changing Application Options

Selection of item H from the main menu will cause the menu shown in Figure 15 or 16 to be displayed. The A/S-4 is shipped from the factory to power up in the SDLC/SNA 3274/76 Interactive mode of operation. Selection of item H from the menu shown in Figure 2 will cause the menu shown in Figure 15 to be displayed.

Figure 16 shows the application options for the A/S-4 when selected to run in the SDLC/SNA 3776/77 Batch mode.

CURRENT:	
Application = SDLC/SNA 3274/76 Interactive	
VDU = ANSI STD; DEC VT100; Teletype 5410, 5420; Televideo 970,960	
Keyboard - STANDARD	
Change: Application Options	
A-Exit	B-XID=018085B8
C-PU Addr=F7	D-SDLC Baud Rate=1200
E-XON/OFF=Both	F-VDU LU Addr=02
G-PRT LU Addr=03	H-PRT LU Type=03
Enter Letter:	

Figure 15

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6.11.1 CHANGING INTERACTIVE APPLICATION OPTIONS

The change Application menu allows 8 operations as described below:

- A. Exit - By entering the letter A the A/S-4 will return to the Main Menu.
- B. XID - By entering a B the operator is able to change the A/S-4 SDLC control unit identifier. Only hexadecimal numbers are allowed to be entered for this selection, the first two digits are fixed at 01. The next character indicates what type of device the A/S-4 (7=3274, 8=3276, 0=3774, 1=3774P, 2=3771 and 3=3776/77).
- C. PU Addr - To change the units physical unit address enter C. Only hexadecimal numbers are allowed to be entered for this selection; addresses x'00'-SSCP address and x'FF'-Global SDLC address can not be used.
- D. SDLC Baud Rate - By entering a D the operator can select the baud rate at which the host will transmit and receive data from the A/S-4. This selection is only used when running SDLC over asynchronous modems or when the A/S-4 is supplying clocks to a front end processor. After entering the letter D the current baud rate will be displayed. To change it, enter the letter Y which will scroll pass each selectable baud rate, when the correct rate is displayed entering any key other than the Y will save the new baud rate.

NOTE

SDLC baud rate has no effect when running with synchronous modems.

- E. XON/OFF - Entering an E allows the selecting of the DC1 (XON), DC3 (XOFF) protocol on the A/S-4's terminal port. This protocol can be used; TO the unit or FROM the unit or in BOTH directions. To disable the XON/OFF protocol, select the option for OFF by the use of the letter Y, entering any key will save the selection. This protocol is used so the A/S-4 or the attached async device will not overflow each others buffers with data. If the A/S-4 has room to store only 20 characters from the VDU, the unit will drop it's RTS signal (can be connected to pin 4, 5, 11, 19 or 20 of EIA connector) and send an XOFF character if option is set for FROM or BOTH. When the A/S-4 is sending data to the VDU, the VDU can stop the flow by dropping it's signal connected to the A/S-4's CTS or by sending a XOFF character, if the A/S-4's XON/XOFF option is set for TO or BOTH.
- F. VDU LU Addr - The VDU LU address can be changed by entering the letter F. For this selection only hexadecimal numbers are allowed to be entered, from the range of X'01' to X'FF' but for most installations the address range of the specific type of control unit is as follows:

IBM* 3274 = X'02'-X'21'

IBM* 3276 = X'02'-X'09'

IBM* 3776 Model 3 and 4 = X'01'-'06'

NOTE

Do not set the VDU and PRT LU addresses to the same values.

- G. PRT LU Addr - By entering a G the operator can select which LU's data will go to the printer attached to the A/S-4's terminal port. Selection of this address is done the same as for the VDU LU addr above.
- H. PRT LU Type - The printer LU type is changed by entering the letter H which causes the LU type to toggle between type 1 and 3. Type 3 print data is preceded with a Write command followed by a WCC with the start printer bit set. Type 1 data doesn't have this Write command or WCC in its data.

CURRENT:

Application = SDLC/SNA 3776/77 Batch

VDU = ANSI STD; DEC VT100; Teletype 5410, 5420; Televideo 970,960

Keyboard = STANDARD

Change: Application Options

A-Exit

C-PU Addr=F7

E-XON/XOFF=OFF

G-PRT LU Addr=02

I-End of File=CTL C

K-Precede TRN Ctl Chars

with DLE=YES

M-Card Input Data Only=YES

N-VDU Auto Logon Msg=LOGON

APPLID (SYSA) LOGMODE

(BUF512) DATA (RMT13,,,

CTL \ L163AC00CTL \)

O-PRT Auto Logon Field=L163AC01

P-VDU/PRT Auto Signon Msg=/*SIGNON

B-XID=01300FF

D-SDLC Baud Rate=1200

F-VDU LU Addr=01

H-Start of File=CTL B

J-Send FMH-2 to VDU=NO

L-Echo Input=YES

Enter Letter:

Figure 16

6.11.2 CHANGING BATCH APPLICATION OPTIONS

The change Application menu allows 16 operations as described below:

A thru G - are the same as for changing Interactive options, refer to section 6.11.1 for details.

- H. Start of File - By entering an H the operator can select the first character that must be received from the VDU before any data is stored and then transmitted to the host. This character is also the first character sent to the VDU when data is received from the host. This is a single character command that can be a control character displayed as CTL or a printable character. The Start of File character can be disabled by setting it to a null X'00' or space character.
- I. End of File - This single character command that causes the VDU to terminate the transmission of data to the host and is received by the VDU when an end of message, is received from the host can be changed by entering an I. This command is selected and disabled the same as the Start of File character described above.
- J. Send FMH-2 to VDU - Option can be toggled on or off by entering the letter J. When this option is enabled "YES" a Function Management Header-2 received from the host is sent to the VDU, for complete details refer to Section 8.1 on Batch operation.
- K. Precede TRN Ctl Chars with DLE - By entering a K, this option can be toggled on or off. This causes transparent control characters (X'3F' or less) received from the host to be made a printable ASCII character by setting its two most significant bits. This character then would be preceded with a DLE character (X'10') before being sent to the VDU if option is set for "YES". This option also determines if data received from the VDU will be preceded by a DLE if the character is less than a X'20' space character.
- L. Echo Input - By entering a L the operator can toggle this option on or off if he would like all characters transmitted by the VDU to the A/S-4 sent back to the VDU.
- M. Card Input Data Only - Option can be toggled on ("YES") by entering an M, which would cause all data received from the VDU to be transmitted to the host in card format by the inbound (VDU) LU. With this option on, no device indicator should be sent to the VDU. When this option is off ("NO"), data received from the VDU must be preceded by a device indicator which determines what device (console, card, printer or disk) is sending the data to the host. Refer to section 8 for more information on the device indicator. With option on, only the inbound (VDU) LU can send data to the host so both LU's must be set for Auto Logon to become active with the application (e.g. JES2).

- N. VDU Auto Logon Msg - This 80 character message can be changed by entering the letter N followed by the Logon message, containing any printable ASCII character (X`20'-X`7F'). The field separator (X`1C') character, which is used to delimit the different logon strings for the VDU LU and the PRT LU. The carriage return (X`0D') character is used to indicate the end of the logon message. The auto logon is enabled whenever any data is present in the logon message. To disable auto logon, enter a carriage return as the first character of the message. This logon message will be sent to the host by the VDU (inbound) LU when this LU becomes active. All data except the CTL\'s (field separators) will be sent.
- O. PRT Auto Logon Field - This 10 character field can be changed by entering the letter O followed by the logon field, containing any printable ASCII character (X`20'-X`7F'). The carriage return (X`0D') character terminates the end of the field. This field if selected, will cause an auto logon message to be sent by the PRT (outbound) LU when the PRT LU becomes active. The logon message will be the same one as for the VDU LU except the data enclosed by CTL\'s will be replaced with the PRT auto logon field. The PRT logon field is disabled by entering a carriage return as the first character of the PRT logon field.
- P. VDU/PRT Auto Signon Msg - This 80 character message can be changed by entering the letter P followed by the signon message, containing any printable ASCII character (X`20'-X`7F'). This carriage return (X`0D') character terminates the signon message. This message if selected, will be sent by the VDU LU and PRT LU to the host after a LU-to-LU session is established for the respected LUs. Entering a carriage return as the first character of the message will disable the auto signon.

NOTE

The auto logon and signon messages cannot contain any character used only in EBCDIC (e.g. cent character X`4A').

6.12 Printer Options

Selection of item I from the main menu will cause the menu in Figure 17 to be displayed. This menu is used to select default printer settings for the printer attached to the A/S-4. Selection of B, C and D are considered programmable in that the host computer can send:

1. Set Horizontal Format (SHF) command to change the B- Column Width.
2. Set Vertical Format Density (SVF) command to change C-Lines Per Page
3. Set Line Density (SLD) command to select a different D-Lines Per Inch.

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These new values, if received from the host would then be sent to the printer if the G-Start Char-FORMS or K-Start Char-DENSITY are selected.

CURRENT:

Application = SDLC/SNA 3274/76 Interactive

VDU = ANSI STD; DEC VT100; Teletype 5410,5420; Televideo 970,960

Keyboard = STANDARD

Change: Printer Options

A-Exit

B-Column Width (xxx)=132

C-Lines Per Page (xxx)=066

D-Lines Per Inch (xxx)=006

E-Single/Double Space=Single

F-MONO/Dual Case = Dual

Forms Set-Up Command Sequence:

G-Start Char-FORMS=

H-Multiple - ('xxx' X Inches)-xxx=

I-Separator Char=CTL @

J-Final Char=CTL @

K-Start Char-DENSITY=

L-Separator Char-DENSITY=CTL @

M-Final Char-DENSITY=CTL @

Enter Letter:

Figure 17

The Printer Options menu allows 13 operations as described below:

- A. Exit - By selection the letter A the A/S-4 will return to the main menu.
- B. Column Width (xxx) - This value is used to define the length of a print line and can be changed by entering the letter B, followed by any decimal number value from 001 to 255. An entry larger than 255 will set the column width to a value less than 255. The host set Horizontal Format (SHF) command can temporarily change the column width used by the printer with the MPP (maximum print position) value enclosed in the SHF command. This new MPP value will not be displayed in the Column Width option. Refer to Section 8, Batch operation for more details.
- C. Lines Per Page (xxx) - Indicates the number of print lines per page (page depth) and is changed by entering the letter C, followed by any decimal number value from 001 to 255. Any entry larger than 255 will set the lines per page to a value less than 255. The host Set Vertical Format (SVF) command can temporarily change the lines per page used by the printer with the MPL (maximum presentation line) value enclosed in the SVF command. This new MPL value will not be displayed in Lines Per Page option. Refer to Section 8, Batch operation for more information.

- D. Lines Per Inch (xxx) - By entering the letter D, followed by any decimal number from 001 to 063, the operator can change the lines per inch (LPI) the printer will print. If a decimal value larger than 063 is entered, the LPI option will be set to a value less than 063. The host Set Line Density (SLD) command can temporarily change the lines per inch used by the printer. This new LPI value will not be displayed in the Lines Per Inch option. See Section 8, Batch operation for more information.
- E. Single/Double Space - Option can be toggled from Single (NL x`15' received from host send CR LF to printer) to Double (NL x`15' received from host send CR LF LF to the printer) line spacing.
- F. MONO/Dual Case - By entering an F the operator can toggle from Dual (upper and lower case characters sent to the printer) to MONO (only upper case characters are sent to the printer, if a lower case character is received from the host it is converted to upper case).

The following commands are sent to the attached printer to change or set the printer for the selected parameters:

- G. Start Char-FORMS - This two character command can be changed by entering the letter G followed by any ASCII control character (X`00'-X`20') for the first character and any ASCII character for the second one. Entering a space character as the first character of the command will disable this option. The Start character is used in conjunction with the multiple, separator and final forms characters to change or set the attached printer's programmable settings, refer to section 6.12.1 for details.
- H. Multiple -xxx- Three character command can be changed by entering the letter H followed by a space or any decimal digit 0 - 9. Entering a space as the first character will turn off this option. This option in conjunction with the Start Char-FORMS, Separator and final forms character can change or set the printer's programmable settings. The Multiple value is also used with the Start Char-DENSITY, Separator and final density characters to change or set the printer's lines per inch setting. Refer to Section 6.12.1 for details.
- I. Separator Char - By entering the letter I followed by a single ASCII character will change the character sent after the Start FORMS character to set the printer's programmable settings. The separator character will not be sent if set for a null (CTL @), this can be done by using the terminal's Break key. Refer to Section 6.12.1 for details.
- J. Final Char - This single character value is sent after the Forms Separator character to set the printer's programmable settings. The final character may be changed by entering the letter J followed by any ASCII character. This final character is disabled by setting it to a null (CTL @). Refer to section 6.12.1 for more information on setting printers forms.
- K. Start Char-DENSITY - This two character command can be changed by entering the letter K followed by any ASCII control character (X`00'-X`20') for the first character and any ASCII character for the second one. Entering a space for the first character of the command will disable this option. The Start character is used in conjunction with the multiple, separator and final density characters to change or set the attached printer's lines per inch setting, refer to Section 6.12.1 for details.
- L. Separator Char - By entering the letter L followed by a single ASCII character will change the character sent after the Start density character to set the printer's lines per inch setting. The separator will not be sent if set for a null (CTL @). Refer to section 6.12.1 for description of command usage.
- M. Final Char - This single character value, sent after the density separator character to set the printer's lines per inch setting, may be changed by entering the letter M followed by any character. This final character is disabled by setting it to a null (CTL @). See Section 6.12.1 for details on operation.

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PROGRAMMABLE PRINTER OPTIONS

Print data received from the host or printed by a local print function will be formatted by the values set in the Printer Options menu (e.g. Column Width, Lines Per Page, Single spacing). The A/S-4 is capable of having numerous printer options changed while communicating with a host program. When the printer is an LU type 3, the only change possible from the program is the number of characters printed per line. This is defined in the write control character (WCC) of the printer message. For an LU type 1, many changes are possible by the use of SNA Character String (SCS) control codes described below:

- a. Set Horizontal Format (SHF) command defines the maximum presentation position (MPP), the left margin (LM), right margin (RM) and up to six horizontal tab stops for a page of print. At the present time, the only value passed on to the printer by the A/S-4 is the MPP (column width) and is done so by the use of the FORMS commands set up in the Printer Options menu. When the SHF is received, the new values override any default values set by the printer option menu and the new forms value is then sent to the printer. If the Start Char-FORMS is disabled, the new values are not sent to the printer.

The following is an example of setting the printer for a 80 column page:

ESC, F, 8, 0 - OKI Microline 83A command to set 80 column page

Printer Options Menu settings:

```
G-Start Char-FORMS=ESC F
H-Multiple - (`xxx' X inches)-xxx=001
I-Separator Char=CTL @
J-Final Char=CTL @
```

- b. Set Vertical Format (SVF) command defines the maximum presentation line (MPL), top margin (TM), bottom margin (BM) and up to six vertical tab stops for a page of print. At the present time the only value passed on to the printer by the A/S-4 is the MPL (lines per page) and is done so by the use of the Forms commands set up in the Printer Options menu. When the SVF is received the new values overrides any default values set by the printer option menu and the new forms value is sent to the printer. If the Start Char-FORMS is disabled, the new values are not sent to the printer.

The following is an example of setting the printers page length of 11 inches.

ESC,[,7920r - GENICOM 3000 command to set 11 inch page

Printer Options Menu settings:

```
G-Start Char-FORMS=ESC [
H-Multiple - (`xxx' X inches)-xxx=720
I-Separator Char=CTL @
J-Final Char=r
```

- c. Set Line Density (SLD) specifies the (LPI) distance to be moved for a single line (vertical spacing), as in NL or LF. When the SLD is received the new value overrides any default lines per inch (LPI) value set by the printer options menu and the new LPI value is then sent to the printer. If the Start Char-DENSITY is disabled, the new values are not sent to the printer.

The following is an example of setting the printer for 8 lines per inch.

ESC, 8 - OKI Microline 83A command to set 8 LPI

Printer Options Menu settings:

```
H-Multiple-(`xxx' X inches)-xxx=001
K-Start Char-DENSITY=ESC
L-Separator Char-DENSITY=CTL @
M-Final Char-DENSITY=CTL @
```

ESC,[,90, ,G - GENICOM 3000 command to set 8 LPI

Printer Options Menu Settings:

```
H-Multiple-(`xxx' X inches)-xxx=720
K-Start Char-DENSITY=ESC [
L-Separator Char-DENSITY=space
M-Final Char-DENSITY=G
```

6.13 Verify Switch Settings

To check the settings of the switches used for the terminal's baud rate, data bits, parity and other selections, enter the letter J in response to the Main Menu. The Verify Switch Settings menu will then be displayed on your screen as in Figure 18.

```
CURRENT:
Application = SDLC/SNA 3274/76 Interactive
VDU = ANSI STD; DEC VT100; Teletype 5410,5420; Televideo 970,960
Keyboard = STANDARD

Verify Switch Settings

A-Exit
B-Restart With New Switch Options

SWITCH SETTINGS
SW6 (NOs. 07-10)=E
SW7 (NOs. 07-10)=F
SW8 (NOs. 01-08)=FF
SW9 (NOs. 01-08)=0B
```

Figure 18

The Verify Switch Settings menu allows 2 operations as described below:

- A. Exit - By entering the letter A the A/S-4 will return to the Main Menu.
- B. Restart With New Switch Options - When a B is typed and the A/S-4 will start over, just like the power has been turned off and then on. When the A/S-4 goes through power up, all switches displayed in the menu will be read and serviced.

The Verify Switch Settings menu will display any change in the switches in the menu. The change in the switch should be followed by the Restart command B to insure that the change has been acted upon.

NOTE

The Verify Switch Settings menu will be displayed when running with the A/S-4 PC card, but the switches have no effect on the program running in the PC card because there are no switches on the PC card, so the values displayed for the switches is actual data read from the PC memory.

6.14 Reload Default Options

By selecting item K from the main menu (Section 6.3), the operator obtains the screen shown in Figure 19 which in turn can change all the options in the A/S-4 to their defaults. Entering any character other than a "Y" will return to the main menu without changing any options, if a "Y" is entered the A/S-4 will go through its power up routine as if the power to the unit was turned off and then on.

Reload Default Options

If sure type Y (ALL PAST WORK WILL BE LOST!)

Figure 19

Refer to section 8.4 of Batch operation for the A/S-4's default options settings.

7. Interactive Operation

The A/S-4 operating in the Interactive mode, emulates an IBM 3274/76 cluster controller with a single LU Type 2 terminal IBM 3278 and an IBM 3287 LU Type 1 or 3 printer. The VDU LU assigned by the H-Application Option menu is the terminal's (IBM 3278) logical unit and the PRT LU is the printer's (IBM 3287) logical unit. With the combination of these two LUs the CRT operator can have a job being printed out on the printer while doing other interactive work with the terminal simultaneously.

As described in Section 6.4 on the actual running of the A/S-4 after all menu items are selected the "WAITING FOR ACTIVE LU" message will be displayed on the terminal. After the LUs become active the operation of the unit is dependent on the SNA host it's communicating with, so no further description of operation is needed.

NOTE

For the Interactive screen to be displayed correctly, the CRT must be selected to disable cursor auto wrap. If a character is in column 80, the cursor will not advance to the next line.

8. Batch Operation

The A/S-4 operating in the Batch mode, emulates an IBM 3776/77 Model 3 and 4 multiple logical unit (MLU) work station with a console, printer, card reader/punch and exchange diskette attached. The A/S-4 supports two of the six possible logical units available for a MLU work station. The VDU LU is designated as the inbound (to host) logical unit and the PRT LU is the outbound (from host) LU. The VDU LU will reject data from the host for the printer, card reader or exchange diskette by sending a negative response to the function management header, which indicates the data is for any of the above devices. The host will then send the data to the PRT LU. This insures that at least one LU will be free to send jobs or console commands while receiving data from the host. Console data is the only data the VDU LU will accept while the PRT LU will receive host data from all devices.

The following is the step by step procedure used by the A/S-4 after the “WAITING FOR ACTIVE LU” message is sent out for Batch operation. Refer to Section 6.4 for steps before ACTIVE LU message.

1. With the “WAITING FOR ACTIVE LU” message displayed, entering any character other than an SO (X`0E’) or SI (X`0F’) will cause the main menu to appear again if SW9/6 is in the ON position (change options on power up). Entering of the SI (X`0F’) command will cause the status of the PU and LUs to be displayed as described in section 8.1. Receipt of an SO (X`0E’) followed by X number of characters will change the A/S-4’s options and cause it to start over from power up. Once one of the LU’s become active a new line status will be displayed.
2. When one or both LUs become active the A/S-4 will send a clear screen command, display the current line status and try to do an Auto Logon if selected for the active LU. The Auto Logon message will be displayed if the Echo Input option is enabled. If no Auto Logon is selected and the host system does not auto-BIND the LUs, the console operator must logon both LUs before the application (e.g. JES2) can communicate with the work station. The device selection character (Section 8.2) must be selected for the inbound LU on one logon message and then set for the outbound LU on the next so both LUs are logged on to the application.
3. When one or both LUs are bound up to an application (e.g. JES2) and receives a set data traffic command, the A/S-4 will display the current line status and send the Auto Signon if selected for the LU in LU-to-LU session. The Auto Signon message will be displayed if the Echo Input option = YES. Once the Auto Signon is sent, jobs and console commands can be sent and received from the host. For the description of inbound data see Section 8.1 and for outbound data refer to Section 8.2.

8.1 Receiving Batch Data from the SNA host

When SNA data is received from the host by the A/S-4, the data is sent to the VDU as follows:

VDU	CMD	Device	On	Start of File	Special Control		End of File	VDU
1		2		3 STX	4	5 Data	6 ETX	1
	CMD	Device	Off					
		7						

1. VDU CMD or CRT lead in character is selected by C-VDU commands menu. This single or dual character command is not sent to the VDU if the Device ON command is selected for a control character (X`1F' or less) or disabled by being set to a space.
2. Device (Printer, Card, Disk) On is selected by C-VDU commands menu. This single or dual character command directs the received SNA data to the correct device; printer, card or disk. This command can also be disabled (turned off) by setting it to a space so that no Device On is sent. If the command is set to a printable character (X`21' or greater) the VDU CMD will precede the Device On command.

NOTE

Console data is not preceded by a VDU CMD or a Device On character.

3. Start of File (SOF) character is selected by H- Application Options menu. This single character command can be disabled (turned off) so that no Start of File character is sent.
4. Special Control (SC) characters precede some types of data mentioned below:
 - a. SOH (\$01) character indicates that a Function Management Header-2 follows. The FMH-2 data is sent to the VDU without converting the SNA EBCDIC data to ASCII (transparent mode) inserting DLE's before ASCII control characters if needed. The VDU CMD and device selection are sent along with this message if selected.

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- b. SI (\$0F) character precedes the SNA line status report of each logical unit. This line status is handled as console data so the VDU CMD and device selection are not sent along with this message. The line status is reported as follows:

SOF	SC	1	2			3	4			EOF
STX	0F	3	3	CR	LF	LU,	LU	CR	LF	ETX

Character Number:

1.
 - 0 (\$30) Physical Unit (PU) not active
 - 1 (\$31) PU active but inbound logical unit (LU) not active
 - 3 (\$33) Inbound LU active but no LU-LU session active
 - 7 (\$37) Inbound LU active and in session with another LU

2.
 - 0 (\$30) PU not active
 - 1 (\$31) PU active but outbound LU not active
 - 3 (\$33) Outbound LU active but no LU-LU session active
 - 7 (\$37) Outbound LU active and in session with another LU

3.
 - DW = PU not active
 - PU = PU active
 - LU = Inbound LU active-can send logon or receive SSCP data
 - LL = Inbound LU in LU-LU session-can send or receive jobs

4.
 - DW = PU not active
 - PU = PU active
 - LU = Outbound LU active-can send logon or receive SSCP data
 - LL = Outbound LU in LU-LU session-can send or receive jobs

5. Normal EBCDIC data received from the SNA host will be converted into ASCII before being transmitted to the VDU. Transparent Data received from the SNA host will be passed to the VDU with no conversions, except when the character is less than a hexadecimal value of \$20. The character would then be preceded by DLE (\$10) and the character itself would be made ASCII printable by setting it's two most significant bits. This addition of the DLE and making the character printable is only done if this option is selected in the Application Options.
Example: Recvd - \$1E = \$10\$DE - Xmitted

6. End of File (EOF) character is selected by H-Application Options menu. This single character command can be disabled (turned off) so that no EOF character is sent.

7. Device OFF is selected by C-VDU commands menu. This single or dual character command terminates the transmission of this device's data. This command can also be disabled (turned off) by setting it to a space so that no Device Off command is sent. If the command is set to a printable character (X`21' or greater) the VDU CMD will precede the Device OFF command or if the Device OFF is set to a control character no VDU CMD will precede it.

NOTE

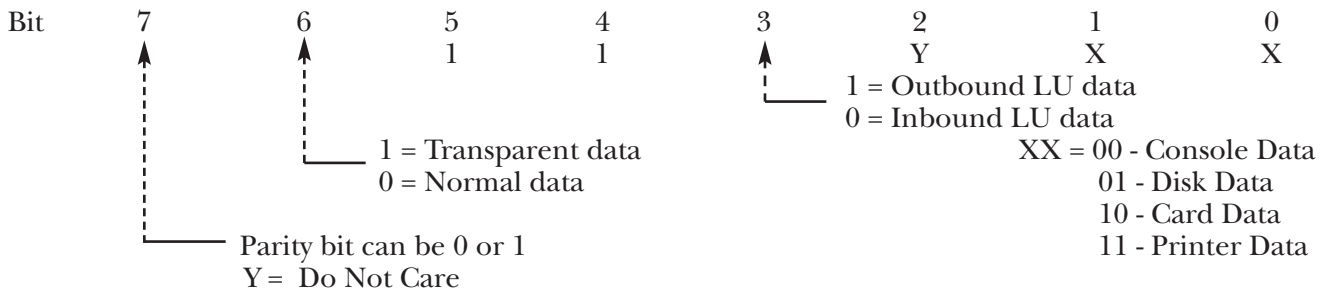
Console data is not terminated by a VDU CMD or a Device OFF character.

8.2 Transmitting Batch Data to the SNA Host

To send data to the SNA computer, the data from the VDU should look like this:

Start of File	Device Selection or Special Control	Data	End of File
1 STX	2	3 Data	4 ETX

1. Start of File (SOF) character is selected by H Application Options menu. This single character command can be disabled (turned off) so that no SOF character needs to be received before handling the incoming data from the VDU.
2. a Device selection character indicates which device (card, disk, printer or console) the data is from, if the data is in transparent form and which Logical Unit (LU) should transmit the data to the SNA host. This character is not sent to the SNA host. The following is the Device Selection character with its assigned bits:



Example: Device selection character of “2”(X`32’) would cause the data to transmit to the SNA host as normal card data by the inbound (VDU) LU.

- 2.b Special Control (SC) character precedes some types of data mentioned below:

- 1) SO(X`0E’) character readies the A/S-4 to receive new options following the SO character. For this to work, the A/S-4 and the VDU must be set for a character length of 8-data bits with no parity. The contents of this string of options is described later. The SO (X`0E’) character does not need to be preceded by the Start of File character or followed by an End of File character.

- 2) SI (X`0F') character asks the A/S-4 for the SNA line status of each Logical Unit. The response to the SI is described in the transmission of the SI character as a special control character. Any data following the SI character will be thrown away until a Start of File is received. The SI (X`0F') character does not need to be preceded by the Start of File character or followed by an End of File character.
3. Normal ASCII data received from the VDU will be converted into EBCDIC before being transmitted to the SNA host computer. This received data will be checked for end of record characters (CR, LF, CRLF and RS) and trailing spaces. Trailing spaces in a record will be truncated. If no end of record character is found after receiving eighty characters, the A/S-4 will insert an end of record character and truncate any trailing blanks before transmitting the record to the SNA host. Transparent data received from the VDU will be passed to the SNA host with no changes, except when the Precede TRN Ctl Chars with DLE option is selected and a DLE followed by another character is received. When this occurs the DLE character is thrown away and the following character's two most significant bits will be changed to zero's. For transparent data to work correctly without the DLE option enabled, both the VDU and the A/S-4 must be set for 8-data bits with no parity and XON/XOFF throttle turned off.
4. End of File (EOF) character is selected by H-Application Options menu. This single character command terminates the transmission of the VDU data. This command can also be disabled (turned off) so that no EOF character is sent, but if disabled all data received may not be sent to the host.

8.3 Batch Printer Operation

Data received from the SNA host directed to the printer device by the use of the function management header - 1 (LU Type 1) or by the write control character (WCC) (LU type 3) is handled differently than card, console or disk data. This printer data is inspected for SNA Character String (SCS) control codes, space characters and transparent data indication. Most of the SCS codes are single character commands (e.g. NL, BS, LF) which are converted into their ASCII equivalent (see appendix C), but a few SCS commands are two or more characters long which are handled as described below:

1. Set Horizontal Format (SHF) command defines the maximum presentation position (MPP), the left margin (LM), right margin (RM) and up to six horizontal tab stops for a page of print. This command is used internally by the A/S-4. The printer may receive new operating conditions depending on printer options selected. Refer to Section 6.12.1, Programmable Printer Options for details.
2. Set Vertical Format (SVF) command defines the maximum presentation line (MPL), top margin (TM), bottom margin (BM) and up to six vertical tab stops for a page of print. This command is used internally by the A/S-4. The printer may receive new operating settings depending on printer options selected. Refer to Section 6.12.1 for details.
3. Set Line Density (SLD) defines the distance to be moved for a single line (vertical spacing), as in NL or LF. This command is used internally by the A/S-4, the printer may receive a new lines per inch (LPI) setting depending on printer selections. See Section 6.12.1 for details.
4. Vertical Channel Select (VCS) selects one of 12 vertical channels to control vertical formatting of the page. This two character command causes a line feed (LF) to be sent to the printer.

When sending data to the printer each character is inspected and then sent if needed. A column count is kept to determine the position of the printer's print head which is compared to the selected column width of the paper. If a space character is found, it is not sent right away to the printer. The following characters are checked and if no other character other than a space is present in the line, a CR LF or CR LF LF (Double spacing) is sent to the printer disregarding the received spaces.

The SNA host can send transparent data to the printer. Most of the time this EBCDIC data is converted into ASCII because transparency is generated by the application (e.g. JES, POWER) which looks for a character less than an EBCDIC space (x'40') in value, if this character is found, the print line is sent in transparent form. Usually the character causing this is a null (X'00') inserted in a JOB name or ROOM number because no value was assigned. If the actual SNA data received from the host needs to be printed, the first two data characters must be a transparent indicator (TRN X '35') followed by the number of transparent characters in hexadecimal. Example message received from SNA host:

TRN # TRN # data —> 1st TRN # generated by JES 2nd TRN # generated by program
The printer can be connected to the A/S-4 in many ways as mentioned below:

1. Printer directly connected to the terminal port with a single cable. In this configuration no VDU is present. The host must do an Auto-BIND to connect the A/S-4 to the application (e.g. JES2, CICS) or use the Auto Logon function of the unit. With a single device, only one LU is needed but both may be used. Normally the VDU LU is the LU used when running with a single LU. The host must start the print job since no VDU is present. Hardware throttle (must have CTS before sending data) or software throttle (XON/OFF protocol) may be used to control the rate of data going to the printer.
2. Printer attached to a VDU's auxiliary/printer port where the VDU is directly connected to the terminal port of the A/S-4. This mode of operation allows the VDU to run at a faster baud rate than it's attached printer. Having two LUs active, one for inbound (to host) data and an outbound (from host) LU will increase the speed of the printer and also allow the VDU to start or stop jobs, interrupt the printer or allow a card device to send a job in to the host while a job is being printed. Software or hardware throttle is supported.
3. Printer attached with the special "Y" VDU/Printer cable. The VDU and printer must run at the same baud rate in this setup and hardware throttle is the only way to control the flow of data to the printer (XON/OFF not supported). When using the "Y" cable, the VDU will be able to receive data while the printer is off-line, replacing paper or throttling. This configuration is very similar to item 2 with two LUs active which allows the VDU to control the printer. In this mode the VDU (PC or computer) can go off-line and run applications while the printer is receiving data from the SNA host, as long as the VDU supplies Data Terminal Ready (DTR) pin 20 to the A/S-4.

8.4 Batch Default Options

The A/S-4 has the capability of loading all its Batch options from the VDU (computer) without going through any menus. This is done by receiving the shift out (X'0E;) character followed by the options selected in hexadecimal form. The VDU and A/S-4 must be set to receive and transmit an 8-data bit word with no parity, so all 8 bits of the hexadecimal characters are received. Once all the new Batch default options are loaded, the A/S-4 is then automatically set to run in the Batch 3776/77 mode. Below is the Batch options with its bit location.

BYTE	DEFAULT	
		*** SDLC (MODEM) PORT OPTIONS ***
1	17	BIT 7 - 6 - 5 & 4 - 00=ASYNC, 01=SYNC 3 THRU 0 = BAUD RATE 0101 = 300 1100 = 4800 0110 = 600 1110 = 9600 0111 = 1200 1111 = 19.2K 1010 = 2400
2	0C	BIT 5 & 4 - STOP BITS: 00=SYNC, 01=1, 10=1.5, 11=2 3 & 2 - WORD LENGTH: 10=7, 11=8 1 & 0 - PARITY: X0=NONE, 01=ODD, 11=EVEN
3	00	BIT 6 & 5 - XON/OFF: 00=OFF, 01=FROM VDU, 10=TO VDU, 11=BOTH 1 & 0 - CHAR CODE: 00=EBCDIC, 01=ASCII
4	F7	SDLC PU ADDRESS
5	80	CUSTOMER OPTIONS A
6	02	CUSTOMER OPTIONS B
7	01	PROTOCOL, 00=3274/76, 01=3776/66
8	30	SDLC 3770 XID
9	0F	
10	FF	
		*** ASYNC (TERMINAL) PORT OPTIONS *** *** INBOUND (VDU) LU ***
11	07	ASYNC BAUD RATE (1200 BAUD) SEE BYTE 1
12	0C	WORD LENGTH: 8 - DATA BITS, NO PARITY SEE BYTE 2
13	01	CHAR OPTION: XON/OFF=OFF, ASCII CHARACTERS

BYTE	DEFAULT	(continued)
14	01	LU ADDRESS
15	81	CUSTOMER OPTION A BIT 7 - TERMINATE MESSAGE TO VDU ON: 1-END OF CHAIN 0-END OF BRACKET 6 - SEND FMH-2 TO VDU 5 - 4 - 3 - 2 - 1 - 1-1ST CHAR FROM VDU DEVICE INDICATOR 0-CARD ONLY INPUT FROM VDU 0 - ECHO INPUT TO VDU
16	21	CUSTOMER OPTIONS B BIT 7 - 6 - 5 - USE DLE (X'10') CHAR TO PRECEDE TRANSPARENT CONTROL CHARS 4 - 3 - 2 - 1 & 0 - LU TYPE (1, 2, OR 3)
17	08	PROTOCOL, 08=ASYNC ASCII
18	07	*** OUTBOUND (PRT) LU *** ASYNC BAUD RATE (1200 BAUD)
19	0C	WORD LENGTH: 8-DATA BITS. NO PARITY
20	01	CHAR OPTION: XON/OFF=OFF, ASCII CHARACTERS
21	02	LU ADDRESS
22	80	CUSTOMER OPTION A BIT 7 - TERMINATE MESSAGE TO PRT ON: 1-END OF CHAIN 0-END OF BRACKET 6 - 5 - 4 - 3 - 2 - 1 - 0 -
23	0	CUSTOMER OPTION B BIT 7 - 6 - 5 - 4 -

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BYTE	DEFAULT	(continued)
		3 - 2 - 1 & 0 - LU TYPE (1, 2, OR 3)
24	08	PROTOCOL, 08=ASYNC ASCII
25	00	*** INBOUND LU XFR *** CHAR OPTION (NOT USED)
26	03	LU ADDRESS (NOT USED)
		CUSTOMER OPTION C
27	00	BIT 7 - 6 - 5 - 4 - 3 - 2 - 1 - 0 -
28	01	CUSTOMER OPTION D BIT 7 - 6 - 5 - 4 - 3 - 2 - 1 & 0 - LU TYPE (NOT USED)
29	00	***OUTBOUND LU XFR *** CHAR OPTION (NOT USED)
30	04	LU ADDRESS (NOT USED)
		CUSTOMER OPTION C
31	00	BIT 7 - 6 - 5 - 4 - 3 - 2 - 1 - 0 -
32	01	CUSTOMER OPTION D BIT 7 - 6 - 5 - 4 -

```

BYTE      DEFAULT (continued)

          3 -
          2 -
          1 & 0 - LU TYPE (NOT USED)

          *** APPLICATION OPTIONS ***

33        C553      DEFAULT CRT = ASCII STANDARD, VT100
          C513 = IBM 3101
          C5D3 = LEAR SIEGLER ADM 3A
          C593 = TELEVIDEO 910 THRU 950
          C613 = IBM PC 3270

35        C26B      DEFAULT KYBD = STANDARD
          C2F3 = IBM PC 3270
          C403 = IBM 3101
          C37B = ADM 1178
          C48B = PNS

37        02        START OF FILE CHARACTER

38        03        END OF FILE CHARACTER

39        VDU/PRT Auto Logon Msg (82 CHARACTERS)
4C,4F,47,...31,33,2C,2C,2C,1C,4C,31,36,33,41,43,30,30,1C,20,29,20,...A0
L O G   1 3 , , , CTL L 1 6 3 A C 0 0 CTL \ ) END

121       PRT Auto Logon Field (10 CHARACTERS)
4C,31,36,33,41,43,30,B1,00,00   LAST CHAR NEGATIVE
L 1 6 3 A C 0 1

131       VDU/PRT Auto Signon Msg (80 CHARACTERS)
2F,2A,53,49,47,4E,4F,4E,20,20,20...A0 LAST CHAR NEGATIVE
/ * S I G N O N           END

```

```

BYTE      DEFAULT (continued)

          *** PRINTER OPTIONS ***

211       84        Column Width =132

212       42        Lines Per Page = 066

213       06        BIT 7 - 1=Mono Case chars  0=Dual Case chars
          6 - 1=Double Spacing  0=Single Spacing
          5 THRU 0 - Lines Per Inch=006

214       20        1st Start Char-FORMS

215       20        2nd Start Char-FORMS

216       20        1st Start Char-DENSITY

```

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BYTE	DEFAULT	(continued)
217	20	2nd Start Char-DENSITY
218	20,20	Multiple character
220	00	Separator Char (FORMS)
221	00	Separator Char-DENSITY
222	00	Final Char (FORMS)
223	00	Final Char-DENSITY
		*** END OF OPTIONS ***

9. Battery RAM

All operating parameters selected from the configuration menus are saved in battery backed-up RAM (Random Access Memory). Therefore, if AC power to the A/S-4 is interrupted, it is unnecessary to reenter the parameters previously selected. If the unit is powered off for seven days or more, the parameters will probably be lost.

10. Maintenance

The A/S-4 is designed to perform all of its tasks with maintenance free operation. You may prolong the life of the unit by cleaning any dust build-up in the unit. Dust may be removed by blowing and/or brushing with a long bristle paint brush.

1. Check to see if the power indicator light is ON: Make sure the unit is plugged in.
2. Check for loose cables and reconnect with retaining screws.
3. Check equipment connected to A/S-4; Modems, CPU, Terminals, and etc. for proper operation.
4. Restart unit after the above has been checked by unplugging A/S-4 and plugging it back in again. Now check for proper operation.

11. Software Upgrade and EPROM Replacement

Each EPROM has a label affixed to the top containing an address and the current data of the software in the IC. To replace the old EPROM with the new EPROM, follow the procedure below:

1. Unplug the A/S-4 and remove the cover by removing the 4 cover screws on the side and lifting the cover upwards.
2. Find the old EPROM on the electronic board. It is the only chip with a label affixed to it.
3. Note the little notch at the end of the EPROM is toward the front of the box. The new EPROMs, when inserted, must also have the notch toward the front of the box.
4. Remove the EPROM by taking a flat head screwdriver a pocket knife, or another flat edged instrument and inserting the flat edge between the ERPOM and the socket holding the EPROM at the two ends where there are no metal legs. Pry one end up just a little and then pry the other end up just a little. Continue prying both ends up just a little in a rocking back and forth motion until the EPROM becomes free of the socket.
5. Insert the new EPROM by aligning one row of metal legs first with one side of the socket. Make sure this row is firmly in the socket but not pushed down in the socket. Now align the other row of legs in the socket pushing the legs firmly in place but not down in the socket. Now if all legs are aligned, push the EPROM into the socket slowly watching to see if any legs bend. If any leg starts to bend or does bend, remove the EPROM as in Step 4 above and straighten the leg as much as possible by hand or with pliers, if available. Try inserting the EPROM again. If a leg continues to bend or breaks off, do not throw the EPROM away, return it to the factory.
6. With cover still off, turn the box on and check for the power up attribute message on the terminal device. If the power up message is displayed continue to step 8.
7. If not, check for any bent legs or any leg that did not go into the socket. Also make sure the EPROM notch is toward the front of the box. Correct any EPROM problems found. If the EPROMs cannot be made to work (display the attribute message), return the A/S-4 and EPROMs to the address on the title page for repair. Please call for a Return Authorization Number.
8. Replace the cover of the A/S-4 and insert and tighten the 4 cover screws.

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USSTAB = RJEINCDT	Table used by VTAM to interpret user logons
VPACING = 6	VTAM sends 6 RUs to NCP before response
ISTATUS = ACTIVE	LU comes up active, can be INACTIVE

APPLICATION VTAM PARAMETERS

BUFFACT = 10	Parameter used with BUFFLIM
--------------	-----------------------------

JESX Parameters

TERMINAL (3776)

RMTnnn	SNA Remote Terminal
LUTYPE 1	Logical Unit type 1 use SCS data
BUFFSIZE = 256 if MAXDATA = 265 512 if MAXDATA = 521	Buffer size of terminal LU
NOCMPCT	Compaction may not be used on this terminal
COMP or NOCOMP	Blank and multiple character compression may or may not be used
CONDEST = nnn	Console responses are to be directed to another terminal
CONSOLE or NOCON	Device other than a console printer may or may not receive console messages
(*) DISCINTV = 0	Terminal disconnect on idle condition, off
LINE = nnn	Logical connection between JESX and the terminal
NUMPR = 1	Number of logical printers at terminal
NUMPU = 1	Number of logical card punches at terminal
NUMRD = 1	Number of logical card readers at terminal
PASSWORD = ccccccc	Line password
ROUTECD = nn	Specify that input from this terminal will have the return destination specified
SETUPMSG	Message telling operator to mount special forms
SETUPINF	Message telling operator to mount special forms is displayed at his terminal and not at host console, maybe SETUPACT to display message at host also

WAITIME = 01	Number of seconds between completion of printing before JES will initialize print of the next output data set
————— PRINTER ATTACHED TO 3776 —————	
Rnnn.PR1	SNA Remote Printer one
OPERATOR	Remote terminal operator uses a \$DF JES command to check the forms queue and then uses a \$TRPn, F=form, Q=class command to set the printer for special forms
CCTL	Carriage control chars are in the data stream xmitted to printer
CKPTLNS = 0	Maximum number of lines in a logical page
CKPTPGS = 0 checkpoint	Number of logical pages to be printed before each is taken. Chain size is the logical page number
CLASS = C(1)...C(n)	Output class used to group all output of a particular type
(*) CMPCT	Specifies that printer has compaction capabilities
COMP	Specifies that printer has compression/expansion capabilities
COMPACT = n	Default compaction table number
START	Printer is active
NOFCBLD	Printer cannot recv forms control buffer (FCB) images from host
LRECL = 132	Logical record length of data xmitted to printer form host
SEP	3776 has a separate console than printer
NOSUSPND	Not used for SNA devices
PRWIDTH = 132	Maximum number of characters to be printed on one line
ROUTECD = nnn	Route code for printer
SELECT = PRINT1	This device is a printer with a sub-address of zero
UCS = ccccccc	Not used for SNA devices

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&NUMTPBF = nnn Number of JESX Data Communications Buffers

&PRTRANS = YES Print Line Translation Option, looks for chars less than X '40'
and if so sends data as transparent

* Option not supported

(1) Option determined by max RU size. A/S-4 availablebuffer size = 2100 characters

(2) Option is available but not installed

(3) Option selected by A/S-4 switch settings

The following is a copy of the suggested LOGMODE table for use by the A/S-4:

RJEMODE	MODETAB
BATCH	MODEENT LOGMODE=BATCH,FMPROF=X'03',TSPROF=X'03', PRIPROT=X'A3',SECPROT=X'A1',COMPROT=X'7080'
MLU1	MODEENT LOGMODE=MLU1,FMPROF=X'03',TSPROF=X'03', PSNDPAC=2,SRCVPAC=1,PRIPROT=X'A8',SECPROT=X'A1',COMPROT=X'7080'
MLU2	MODEENT LOGMODE=MLU2,FMPROF=X'03',TSPROF=X'03', PSNDPAC=4,SRCVPAC=2, PRIPROT=X'A3',SECPROT=X'A1',COMPROT=X'7080'
MLU3	MODEENT LOGMODE=MLU3,FMPROF=X'03',TSPROF=X'03', PSNDPAC=6,SRCVPAC=3, PRIPROT=X'A3',SECPROT=X'A1',COMPROT=X'7080'
INTERACT	MODEENT LOGMODE=INTERACT,FMPROF=X'03',TSPROF=X'03', PRIPROT=X'B1',SECPROT=X'A0',COMPROT=X'3040'
NOCOMP	MODEENT LOGMODE=NOCOMP,FMPROF=X'03',TSPROF=X'03', PRIPROT=X'A1',SECPROT=X'A1',COMPROT=X'7080'
COMP	MODEENT LOGMODE=COMP,FMPROF=X'03',TSPROF=X'03', PRIPROT=X'A3',SECPROT=X'A1',COMPROT=X'7080'
BUF512	MODEENT LOGMODE=BUF512,FMPROF=X'03',TSPROF=X'03', RUSIZES=X'8686', PRIPROT=X'A3',SECPROT=X'A3',COMPROT=X'7080'
BUF256	MODEENT LOGMODE=BUF256,FMPROF=X'03',TSPROF=X'03', RUSIZES=X'8585', PRIPROT=X'A3',SECPROT=X'A3',COMPROT=X'7080'
COMPACT	MODEENT LOGMODE=COMPACT,FMPROF=X'03',TSPROF=X'03', RUSIZES=X'8585', PSERVIC=X'01106000F100808000010040', PRIPROT=X'A3',SECPROT=X'A1',COMPROT=X'7080'
	MODEEND
	END

The following is a copy of the suggested USSTAB table for use by the A/S-4.

RJEINCDT	USSTAB
LOG	USSCMD CMD=LOGON,REP=LOGON,FORMAT=BAL USSPARM PARM=P1,REP=APPLID USSPARM PARM=P2,REP=LOGMODE USSPARM PARM=P3,REP=DATA
SIGNON	USSCMD CMD=SIGNON,REP=LOGON,FORMAT=BAL USSPARM PARM=APPLID,DEFAULT=JES2 USSPARM PARM=LOGMODE,DEFAULT=BUF512 USSPARM PARM=USER,REP=DATA
RMT101	USSCMD CMD=RMT101,REP=LOGON,FORMAT=BAL USSPARM PARM=APPLID,DEFAULT=JES2 USSPARM PARM=LOGMODE,DEFAULT=BUF512 USSPARM PARM=DATA,REP=RMT101
RMT102	USS CMD=RMT102,REP=LOGON,FORMAT=BAL USSPARM PARM=APPLID,DEFAULT=JES2 USSPARM PARM=LOGMODE,DEFAULT=BATCH USSPARM PARM=DATA,REP=RMT102
RMT103	USSCMD CMD=RMT103,REP=LOGON,FORMAT=BAL USSPARM PARM=APPLID,DEFAULT=JES2 USSPARM PARM=LOGMODE,DEFAULT=MOCOMP USSPARM PARM=DATA,REP=RMT103
LOGOFF	USSCMD CMD=LOGOFF,FORMAT=BAL USSPARM PARM=APPLID USSPARM PARM=TYPE,DEFAULT=COMD USSPARM PARM=HOLD,DEFAULT=YES
EOD	USSCMD CMD=EOD,FORMAT=BAL USSPARM PARM=APPLID USSPARM PARM=TYPE,DEFAULT=UNCOND USSPARM PARM=HOLD,DEFAULT=NO
SIGNOFF	USSCMD CMD=SIGNOFF,FORMAT=BAL USSPARM PARM=APPLID USSPARM PARM=TYPE,DEFAULT=COND USSPARM PARM=HOLD,DEFAULT=YES
	USSEND END

13. Troubleshooting Problems and Odd Installation Problems

Listed below are some of the common problems found with installation and operation of the A/S-4 unit. Find the problem you are experiencing and try the remedies listed to fix the problem.

PROBLEM	SYMPTOM	POSSIBLE REMEDIES
1. No Power	Power light on front of A/S-4 is OFF	<ul style="list-style-type: none"> a. check wall power out-let for proper operation. b. Check to make sure the power transformer for the A/S-4 is plugged into the wall and into the unit all the way.
2. No power up message	TCTS light is off, on front of A/S-4	<ul style="list-style-type: none"> a. A/S-4 Switches SW2, SW3 and SW6 for terminal port are not set correctly, refer to Section 4 in manual b. Terminal device does not supply DTR (if modem device is hooked to terminal port, it does not supply DSR). Turn on SW6/4 so A/S-4 unit will supply DTR (if modem device turn on SW6/5 so A/S-4 unit will supply DSR).
	TCTS light is on and TTX light does not blink when power is applied to the A/S-4 unit	<ul style="list-style-type: none"> a. Speed detect option is on, type "S" to get power up message. b. Typing "S" for speed option still does not give power up message. Baud rate cannot be matched by speed detect option so set up switches on A/S-4 to match terminal baud rate (refer to Section 4.1).

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PROBLEM	SYMPTOM	POSSIBLE REMEDIES
<p>3. Power up message has some incorrect letters or just garbage letters displayed</p>	<p>TCTS light is on and TTX light does blink when power is applied to the A/S-4</p>	<ul style="list-style-type: none"> a. Baud rate of A/S-4 does not match terminal baud rate. Check baud rate switches, refer to Section 4.1. b. Switches SW3/1,2,3 and 4 are not set correctly,, refer to Section 4.1 and 4.2. a. Baud rate of A/S-4 does not match terminal baud rate. Check baud rate switches, refer to Section 4.1. b. Parity and word length of A/S-4 and terminal do not match. Check option switches, refer to Section 4.5.
<p>4. Receive power up message on terminal but typing home or space bar will not display main menu</p>	<p>TCD light on front of the A/S-4 is off</p> <p>TCD light is on, on the front of the A/S-4 and the TRX light does not flash when a key is typed on the terminal.</p> <p>TCD light is on on the front of the A/S-4 and the TRX light does flash when a key is typed on the terminal.</p>	<ul style="list-style-type: none"> a. A/S-4 switches SW2, SW3 and SW6 for terminal port not set correctly, refer to Section 4 in manual. b. Terminal device does not supply DTR (if modem device is hooked to terminal port, it does not supply DSR). Turn on SW6/4 so A/S-4 unit will supply DTR. (If modem device turn on SW6/5 so A/S-4 unit will supply DSR). a. Switches SW3/1,2,3 and 4 are not set correctly, refer to Section 4.1 and 4.2. a. Switches SW2/8 and SW6/1, 2 and 3 are set incorrectly, refer to Section 4.1 and 4.2.

Appendix A: 3274 SNA Communication Operations

This appendix is intended to give a VDU operator the basic description of the System Network Architecture (SNA) for a 3278 CRT (or like device) in the area of remote communications.

First the 3278 CRT is connected to a 3274 controller that allows 32 3278 CRT's to communicate to an IBM mainframe computer. SNA calls the 3274 controller a PU (physical unit) and the 3278 CRT a LU (logical unit).

Communications with the host computer and the CRT basically follow the following steps.

1. The line is activated - This means a phone line is established between the host computer and the 3274 controller. This maybe done by dialing a phone for dialup applications or having a host computer operator connect a leased phone line.
2. The PU is activated - The host sends the first message down the phone line to the 3274 controller (PU) to tell it to start communications. The 3274 controller then tells the host when it is ready to start.
3. The LUs are activated - The host now tells all the 3278 CRTs (LUs) to start communications. The CRTs then tell the host when they are ready to start.
4. SSCP (System Services Control Point) sends a message to the LU - The CRT at this point receives an enter request logon message from SSCP if the host system is GENed to send a SSCP message. A GEN is how the host system operators set up different CRT options. At this point the CRT is considered to be in a SSCP to LU session. Session means that two devices are talking with each other.
5. The CRT operator may now enter a request logon message for an application - This allows the operator to request a logon to different applications like CICs, IMS or TSO on any available system. (example; Test System A or B or a Production System). If the CRT will always be assigned to one application, the host system may be GENed (optioned) to automatically request an application logon, in which case this setup does not need to be performed by the VDU operator.
6. The system now BINDs the CRT to the application - This establishes communication between the CRT and the application. The 3274 controller will usually clear the CRT screen when this happens. The CRT is now considered to be in a LU to LU session.
7. The application sends a welcome or signon application message to the CRT - This now allows the operator to run his application or transactions. While communicating with the application, it is usually on a demand-response basis. The operator enters data or answers a question and the host sends back the information or more questions. This proceeds until the operator has completed the assignment.

NOTE

Some applications may not send a welcome message. The operator must send the first message to start the transactions.

8. After the operator has finished working, he should signoff the application. The system will then UNBIND the CRT so that the CRT and applications are no longer communicating with each other. This leaves the CRT available for an operator to logon to another application. The 3274 controller will usually clear the CRT when this happens. SSCP will then send an enter request logon message which puts the CRT back to step 4 so as to start things over again.

Appendix B: General 3770 SNA Communication Operations

This appendix is intended to give a basic description of the System Network Architecture (SNA) operation for an IBM 3776/77 Model 3 and 4 multiple logical unit (MLU) work station in the area of remote communications.

The 3776/77 Model 3 and 4 is a stand alone work station consisting of; 1) console with keyboard and display. 2) console-mounted line printer with optional card reader and line printer. SNA calls the controller port a PU (Physical Unit) and the attached printers, consoles, card readers and disk LUs (Logical Unit).

Communications with the host computer and the work station basically follows the following steps.

1. The line is activated - This means a phone line is established between the host computer and the work station. This maybe done by dialing a phone for dialup applications or having a host computer operator connect a leased phone line.
2. The PU is activated - The host sends the first message down the phone line to the 3776/77 work station's controller (PU) to tell it to start communications. The work station then tells the host when it is ready to start.
3. The LUs are activated - The host now tells all the attached devices (LUs) to start communications. The devices respond to host when they are ready to start.
4. SSCP (System Services Control Point) may send a message to the console requesting a logon message for the active LUs if the host system is GENed to send a SSCP message. A GEN is how the host system operators set up different work station options. At this point the console is considered to be in a SSCP to LU session. Session means that two devices are talking with each other.
5. The work station operator may now enter a request logon message for an application - This allows the operator to request a logon to different applications like JES2, POWER or CICs on any available system. For example; Test System A or B or a Production System. If the work station will always be assigned to one application, the host system may be GENed (optioned) to automatically request an application logon, in which case this setup does not need to be performed by the work station operator.
6. After a good logon message is received by the host it will BIND the requested LUs to the application - This establishes communication between the work station and the application. The devices (console, printer, readers, disk) are now considered to be in a LU-to-LU session.
7. The application usually sends an active session message to the console - This allows the operator to run his application or transactions. At this time the operator can down-line load a job to the host, receive a job from the host, receive print, ask for status of jobs running on the system and many other operations.

8. After the operator has finished working, he should signoff the application. The system will UNBIND all the LUs from the host system so that the work station and application are no longer communicating with each other. This leaves the work station available for an operator to logon to another application. SSCP may send an enter request logon message which puts the work station back to step 4 so as to start things over again.

Batch Terms:

Function Management Header 1 (FMH-1) is used to select a destination within an LU. When sent by the A/S-4 it indicates to the host which device (card reader or console) is sending data to the host, used in the same way when host sends FMH-1 to the A/S-4.

Function Management Header 2 (FMH-2) specifies the data management activities to be performed at the destination selected with the FMH-1. Typical data management activities are adding and replacing records, numbers of copies to print and date data created.

Appendix C: Conversion Charts

The following pages contain the EBCDIC-to-ASCII Character conversion chart. Characters under the “RECV” heading are the EBCDIC characters received from the SNA host. The ASCII equivalent is to the right under the “CONV” column. When EBCDIC data is directed to the printer the characters will be changed as described under the “PRT CONV” column.

The following notes are used to clarify the charts.

1. New Line - Send carriage return line feed (CRLF) to VDU.
2. Vertical Channel Select - Sends one line feed to printer and throws away next character.
3. Horizontal Tab - Positions print head by using spaces to correct column to page if tabs setup by SHF command.
4. Vertical Tab - Positions page by using CRLFs to correct line if tabs setup by SVF command.
5. Form Feed - Sends form feed character, or number of CRLFs if option set to position paper to top of page.
6. Throws away this character and two following if printer selected for a LU Type 3 running in Interactive mode(cursor positioning).
7. Sends CRLF to printer, checking for bottom of page and if so, positions paper to top of form by using additional CRLFs or sending a form feed.
8. Sends Backspace to printer if printhead positioned to column 2 or greater.
9. Sends LF to printer, checking for bottom of page and if so, positions paper to top of form by using CRLFs or the form feed character.
10. Indicates start of SNA character string (SCS), characters following will be handled as described in Section 8.3 (SHF, SVF, SLD and VCS command).
11. Throw away this character and next one indicating number of transparent characters, following data will not be converted to ASCII.

THW = Throw Away Character

EBCDIC-to-ASCII Character Conversion

EBCDIC-to-ASCII		
RECV	CONV	PRT CONV
00-NUL	00-NUL	20-SP
01-SOH	01-SOH	THW
01-STX	02-STX	THW
03-STX	03-ETX	THW
04-PF	00-	NOTE 2
05-HT	09-HT	NOTE 3
06-LC	00-	THW
07-DEL	7F-DEL	THW
08-	00-	THW
09-RLF	00-	THW
0A-SHM	00-	THW
0B-VT	0B-VT	NOTE 4
0C-FF	0C-FF	NOTE 5
0D-CR	0D-CR	OD-CR
0E-SO	0E-SO	THW
0F-SI	0F-SI	THW
10-DLE	10-DEL	THW
11-DC1	11-DC1	NOTE 6
12-DC2	12-DC2	THW
13-DC3	13-DC3	THW
14-RES	00-	THW
15-NL	NOTE 1	NOTE 7
16-BS	08-BS	NOTE 8
17-IL	00-	THW
18-CAN	18-CAN	THW
19-EM	19-EM	THW
1A-CC	00-	THW
1B-	00-	THW
1C-IFS	00-	THW
1D-IGS	1D-GS	THW
1E-IRS	1E-RS	NOTE 7
1F-IUS	1F-IUS	THW

EBCDIC-TO-ASCII		
RECV	CONV	PRT CONV
20-DS	00	THW
21-SOS	00	THW
22-FS	1C-FS	THW
23-	00-	THW
24-BYP	00-	THW
25-LF	0A-LF	NOTE 9
26-ETB	17-ETB	THW
27-ESC	1B-ESC	THW
28-	00-	THW
29-	00-	THW
2A-SM	00-	THW
2B-	00-	NOTE 10
2C-	00-	THW
2D-ENQ	05-ENQ	THW
2E-ACK	06-ACK	THW
2F-BEL	07-BEL	07-BEL
30-	00-	THW
31-	00-	THW
32-SYN	16-SYN	THW
33-	00-	THW
34-PN	00-	THW
35-RS	1E-RS	NOTE 11
36-UC	00-	THW
37-EOT	04-EOT	THW
38-	00-	THW
39-	00-	THW
3A-	00-	THW
3B-	00-	THW
3C-DC4	14-DC4	THW
3D-NAK	15-NAK	THW
3E-	00-	THW
3F-SUB	1A-SUB	THW

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EBCDIC-to-ASCII		
RECV	CONV	PRT CONV
40-SP	20-SP	20-SP
41-	00-	00-
42-	00-	00-
43-	00-	00-
44-	00-	00-
45-	00-	00-
46-	00-	00-
47-	00-	00-
48-	00-	00-
49-	00-	00-
4A-CENT	24-\$	24-\$
4B-.	2E-.	2E-.
4C-<	3C-<	3C-<
4D-(8-(28-(
4E+	2B+	2B+
4F-	7C-	7C-
50-&	26-&	26-&
51-	00-	00-
52-	00-	00-
53-	00-	00-
54-	00-	00-
55-	00-	00-
56-	00-	00-
57-	00-	00-
58-	00-	00-
59-	00-	00-
5A-!	21-!	21-!
5B-\$	24-\$	24-\$
5C-*	2A-*	2A-*
5D-)	29-)	29-)
5E-	3B-;	3B-;
5F-	5E-^	5E-^

EBCDIC-TO-ASCII		
RECV	CONV	PRT CONV
60-	2D-	2D- -
61-	2F-/	2F-/
62-	00-	00-
63-	00-	00-
64-	00-	00-
65-	00-	00-
66-	00-	00-
67-	00-	00-
68-	00-	00-
69-	00-	00-
6A-	7C-	7C-
6B-,	2C-,	2C-,
6C-%	25-%	25-%
6D- <u> </u>	5F- <u> </u>	5F- <u> </u>
6E->	3E->	3E->
6F-?	3F-?	3F-?
70-	30-0	30-0
71-	00-	00-
72-	00-	00-
73-	00-	00-
74-	00-	00-
75-	00-	00-
76-	00-	00-
77-	00-	00-
78-	00-	00-
79-\	60-\	60-\
7A-:	3A-:	3A-:
7B-#	23-#	23-#
7C-@	40-@	40-@
7D-'	27-'	27-'
7E-=	3D-=	3D-=
7F-"	22-"	22-"

APPENDIX C: Conversion Charts

EBCDIC-to-ASCII		
RECV	CONV	PRT CONV
80-	00-	00-
81-a	61-a	61-a
82-b	62-b	62-b
83-c	63-c	63-c
84-d	64-d	64-d
85-e	65-e	65-e
86-f	66-f	66-f
87-g	67-g	67-g
88-h	68-h	68-h
89-i	69-i	69-i
8A-	00-	00-
8B-	00-	00-
8C-	00-	00-
8D-	00-	00-
8E-	00-	00-
8F-	00-	00-
90-	00-	00-
91-j	6A-j	6A-j
92-k	6B-k	6B-k
93-1	6C-1	^c-1
94-m	6D-m	6D-m
95-n	6E-n	6E-n
96-o	6F-o	6F-o
97-p	70-p	70-p
98-q	71-q	71-q
99-r	72-r	72-r
9A-	00-	00-
9B-	00-	00-
9C-	00-	00-
9D-	00-	00-
9E-	00-	00-
9F-	00-	00-

EBCDIC-TO-ASCII		
RECV	CONV	PRT CONV
A0-	00-	00-
A1-~	7E-~	7E-~
A2-s	73-s	73-s
A3-t	74-t	74-t
A4-u	75-u	75-u
A5-v	76-v	76-v
A6-w	77-w	77-w
A7-x	78-x	78-x
A8-y	79-y	79-y
A9-z	7A-z	7A-z
AA-	00-	00-
AB-	00-	00-
AC-	00-	00-
AD-	00-	00-
AE-	00-	00-
AF-	00-	00-
B0-	00-	00-
B1-	00-	00-
B2-	00-	00-
B3-	00-	00-
B4-	00-	00-
B5-	00-	00-
B6-	00-	00-
B7-	00-	00-
B8-	00-	00-
B9-	00-	00-
BA-	00-	00-
BB-	00-	00-
BC-	00-	00-
BD-	00-	00-
BE-	00-	00-
BF-	00-	00-

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EBCDIC-to-ASCII		
RECV	CONV	PRT CONV
C0-{	7B-{	7B-{
C1-A	41-A	41-A
C2-B	42-B	42-B
C3-C	43-C	43-C
C4-D	44-D	44-D
C5-E	45-E	45-E
C6-F	46-F	46-F
C7-G	47-G	47-G
C8-H	48-H	48-H
C9-I	49-I	49-I
CA-	00-	00-
CB-	00-	00-
CC-	00-	00-
CD-	00-	00-
CE-	00-	00-
CF--	00-	00-
D0-}	7D-}	7D-}
D1-J	4A-J	4A-J
D2-K	4B-K	4B-K
D3-L	4C-L	4C-L
D4-M	4D-M	4D-M
D5-N	4E-N	4E-N
D6-O	4F-O	4F-O
D7-P	50-P	50-P
D8-Q	51-Q	51-Q
D9-R	52-R	52-R
DA-	00-	00-
DB-	00-	00-
DC-	00-	00-
DD-	00-	00-
DE-	00-	00-
DF-	00-	00-

EBCDIC-TO-ASCII		
RECV	CONV	PRT CONV
E0-\	5C-\	5C-\
E1-	00-	00-
E2-S	53-S	53-S
E3-T	54-T	54-T
E4-U	55-U	55-U
E5-V	56-V	56-V
E6-W	57-W	57-W
E7-X	58-X	58-X
E8-Y	59-Y	59-Y
E9-Z	5A-Z	5A-Z
EA-	00-	00-
EB-	00-	00-
EC-	00-	00-
ED-	00-	00-
EE-	00-	00-
EF-	00-	00-
F0-0	30-0	30-0
F1-1	31-1	31-1
F2-2	32-2	32-2
F3-3	33-3	33-3
F4-4	34-4	43-4
F5-5	35-5	35-5
F6-6	36-6	36-6
F7-7	37-7	7-7
F8-8	38-8	38-8
F9-9	39-9	39-9
FA-	00-	00-
FB-	00-	00-
FC-	00-	00-
FD-	00-	00-
FE-	00-	00-
FF-	00-	00-

The following chart is the ASCII-to-EBCDIC character conversion chart. Data received from the VDU in ASCII format is found in the "RECV" column and when the specific character is transmitted to the SNA host it will appear as described in the "CONV" column.

ASCII-to-EBCDIC Character Conversion

ASCII-to-EBCDIC		ASCII-to-EBCDIC	
RECV	CONV	RECV	CONV
00-NUL	00-NUL	20-SP	40-SP
01-SOH	01-SOH	21-!	5A-!
02-STX	02-STX	22-"	7F-"
03-ETX	03-ETX	23-#	7B-#
04-EOT	37-EOT	24-\$	5B-\$
05-ENQ	2D-ENQ	25-%	6C-%
06-ACK	2E-ACK	26-&	50-&
07-BEL	2F-BEL	27-'	7D-'
08-BS	16-BS	28-(4D-(
09-HT	05-HT	29-)	5D-)
0A-LF	25-LF	2A-*	5C-*
0B-VT	0B-VT	2B-+	4F-+
0C-FF	0C-FF	2C-,	6B-,
0D-CR	0D-CR	2D- -	60- -
0E-SO	0E-SO	2E-.	4B-.
0F-SI	0F-SI	2F-/	61-/
10-DLE	10-DLE	30-0	F0-0
11-DC1	11-DC1	31-1	F1-1
12-DC2	12-DC2	32-2	F2-2
13-DC3	13-DC3	33-3	F3-3
14-DC4	3C-DC4	34-4	F4-4
15-NAK	3D-NAK	35-5	F5-5
16-SYN	32-SYN	36-6	F6-6
17-ETB	26-ETB	37-7	F7-7
18-CAN	18-CAN	38-8	F8-8
19-EM	19-EM	39-9	F9-9
1A-SUB	3F-SUB	3A-:	7A-:
1B-ESC	27-ESC	3B-;	5E-;
1C-FS	22-FS	3C-<	4C-<
10-GS	10-IGS	3D-=	7E-=
1E-RS	35-RS	3E->	6E->
1F-US	00-	3F-?	6F-?

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ASCII-to-EBCDIC	
RECV	CONV
40-@	7C-@
41-A	C1-A
42-B	C2-A
43-C	C3-C
44-D	C4-D
45-E	C5-E
46-F	C6-E
47-G	C7-G
48-H	C8-H
49-I	C9-I
4A-J	D1-J
4B-K	D2-K
4C-L	D3-L
4D-M	D4-M
4E-N	D5-N
4F-O	D6-O
50-P	D7-P
51-Q	D8-Q
52-R	D9-R
53-S	E2-S
54-T	E3-T
55-U	E4-U
56-V	E5-V
57-W	E6-W
58-X	E7-X
59-Y	E8-Y
5A-Z	E9-Z
5B-[00-
5C-\	E0-\
5D-]	00-
5E-^	5F-^
5F-~	6D-~

ASCII-to-EBCDIC	
RECV	CONV
60-`	79-`
61-a	81-a
62-b	82-b
63-c	83-c
64-d	84-d
65-e	85-e
66-f	86-e
67-g	87-g
68-h	88-h
69-i	89-i
6A-j	91-j
6B-k	82-k
6C-l	93-l
6D-m	94-m
6E-n	95-n
6F-o	96-o
70-p	97-p
71-q	98-q
72-r	99-r
73-s	A2-s
74-t	A3-t
75-u	A4-u
76-v	A5-v
77-w	A6-w
78-x	A7-x
79-y	A8-y
7A-z	A9-z
7B-{	C0-{
7C-	6A-
7D-}	D0-}
7E-~	A1-~
7F-DEL	7F-DEL



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